DRAFT FINAL

SITE-SPECIFIC ENVIRONMENTAL BASELINE SURVEY ST LOUIS ARMY AMMUNITION PLANT ST LOUIS, MISSOURI CONTRACT NO DACW41-96-D-8014 TASK ORDER 0019

Prepared for
Department of the Army
U S Army Engineer District
Kansas City District
Corps of Engineers
Kansas City Missouri

And
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Ft McPherson Georgia

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Re Transmittal of Draft Final Site Specific Environmental Baseline Survey Report
for the St Louis Army Ammunition Plant St Louis MO
Contract No DACW41 96 D 8014 Task Order No 0019

Dear Mr Eaton

We are hereby transmitting six copies of the subject document for distribution in accordance with the attached distribution list The 2 copies of the subject document for HQDA BRAC have been sent directly to Mr Preston under separate cover

Please call Matt Phoenix at 913/344 1085 if you require additional information

Very truly yours

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DRAFT FINAL SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY REPORT

ST LOUIS ARMY AMMUNITION PLANT
ST LOUIS, MISSOURI

CONTRACT NO DACW41 96 D 8014
TASK ORDER NO 0019

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LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

1 1 1 TCA	1 1 1 Trichloroethane
1 1 DCA	1 1 Dichloroethane
1 1 DCE	1 1 Dichloroethene
1 2 DCA	1 2 Dichloroethane
2 3 7 8 TCDD	2 3 7 8 Tetrachlorodibenzo p dioxin
4 4 DDE	4 4 Dichlorodiphenyldichloroethene
4 4 DDT	4 4 Dichlorodiphenyltrichloroethene
ACI	Arrowhead Contracting Inc
ACM	Asbestos Containing Material
AMCCOM	U S Army Armament Munitions and Chemical Command
AMCOM	U S Army Aviation and Missile Command
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
ATCOM	U S Army Aviation and Troop Command
AVSCOM	U S Army Aviation Systems Command
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BGS	Below Ground Surface Inc
BTEX	Benzene Toluene Ethylbenzene and Xylenes
CA	Chloroethane
CALM	Cleanup Levels for Missouri
CENWK	U S Army Corps of Engineers Kansas City District
CEWES	U S Army Corps of Engineers Waterways Experiment Station Environmental Laboratory Omaha Nebraska
CF	Chloroform
cm^2	square centimeter
CSP	Contingency Sampling Program
CT	Carbon Tetrachloride
EBS	Environmental Baseline Survey
EDR	Environmental Data Resources Inc
EPA	U S Environmental Protection Agency
FOST	Finding of Suitability to Transfer
FSP	Field Sampling Plan
g	grams
gpm	Gallons per minute
HHRA	Human Health Risk Assessment
HVAC	Heating Ventilation and Air Conditioning
IDW	Investigation Derived Waste
K_{oc}	Sorption coefficient
K_{ow}	Octanol/water partition coefficient
kg	kilograms
L	Liter
LBP	Lead Based Paint
MDNR	Missouri Department of Natural Resources
mg	milligrams
mm	millimeter

LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

msl	mean sea level
MW	Monitoring Well
NOAA	National Oceanic and Atmospheric Administration
NON	Notice of Noncompliance
NVLAP	National Voluntary Laboratory Accreditation Program
ODESCO	ODESCO Industrial Services Inc
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PFE	Plant Facilities and Engineering Inc
pg	picograms
PRGs	Preliminary Remediation Goals
PURO	PURO Chemical Division
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SEMCOR	Titan Systems Corporation SEMCOR Division
SLAAP	St Louis Army Ammunition Plant
SLOP	St Louis Ordnance Plant
SSEBS	Site Specific Environmental Baseline Survey
STL	Severn Trent Laboratories Inc
SVOC	Semi Volatile Organic Compound
TCE	Trichloroethene
TEF	Toxic Equivalent Factors
TEQ	Toxicity Equivalency Quotient
TPH	Total Petroleum Hydrocarbons
TPH DRO	Total Petroleum Hydrocarbons Diesel Range Organics
TPH GRO	Total Petroleum Hydrocarbons Gasoline Range Organics
TTEMI	Tetra Tech EM Inc
ug	micrograms
URS	URS Group Inc
USACE	U S Army Corps of Engineers
USAEHA	U S Army Environmental Hygiene Agency
USATHMA	U S Army Toxic and Hazardous Materials Agency
UST	Underground Storage Tank
VC	Vinyl Chloride
VOC	Volatile Organic Compound
WHO	World Health Organization

0 1 PURPOSE OF REPORT

The purpose of this Site Specific Environmental Baseline Survey (SSEBS) is to document the environmental condition of the St Louis Army Ammunition Plant (SLAAP) herein referred to as the Site including the nature type and extent of contamination The Baseline Human Health Risk Assessment (HHRA) which will be submitted under separate cover will provide an assessment of the risks posed to human health posed by such contamination including the potential for future releases Finally this SSEBS and the HHRA will support the Army in the Finding of Suitability to Transfer (FOST) determination process in accordance with American Society for Testing and Materials (ASTM) Method D 6008 96 Standard of Practice for Environmental Baseline Surveys and ASTM Method E 1527 97 Standard Practice for Environmental Site Assessments Phase I Environmental Site Assessment Process (ASTM 1996)

This document was prepared by URS Group Inc (URS) on behalf of the U S Army Corps of Engineers (USACE) Kansas City District (CENWK) and the Base Realignment and Closure (BRAC) Headquarters Fort McPherson Atlanta Georgia under URS Contract number DACW41 96 D 8014 Task Order 0019 The SSEBS is intended to be used in its entirety and no excerpts may be taken to be representative of the findings of this investigation The use or re use of this document or the findings conclusions or recommendations presented herein by any other party or parties is at the sole risk of said user URS makes no representations regarding the value or marketability of this property or its suitability for any particular use and none should be inferred based on this SSEBS

0 2 SITE BACKGROUND

St Louis Ordnance Plant (SLOP) was constructed in 1941 as a 276 acre small arms ordnance plant that produced 30 and 50 caliber munitions In 1944 21 05 acres in the northeast portion of SLOP were converted from small arms munitions production to 105 millimeter (mm) Howitzer shell production and this portion was designated as SLAAP Additional land was acquired on the north side of SLAAP to construct two buildings to support the Howitzer shell manufacturing process Currently the SLAAP property contains seven unoccupied buildings that were used to house SLAAP s main operating processes

0 3 INVESTIGATION AREAS

Since construction of the facility in 1941 SLAAP has supported two primary production missions First several of the SLAAP buildings were utilized in support of 30 caliber munitions production as part of SLOP operations from 1941 through 1944 Second SLAAP was utilized to produce 105 mm Howitzer shells during intermittent operation phases from 1944 through 1969 Investigation Areas were established to assess potential contamination on the Site based on these production missions historical process knowledge previous investigations conducted at the Site and input from the regulatory agencies The Investigation Areas and the media sampled are presented below

- Building 1 – Concrete and Soils
- Building 2 – Asbestos Concrete Products Soil and Surfaces

- Building 3 – Soil (Investigated and building demolished under separate contract)
- Building 4 – Concrete Soil and Surfaces
- Building 5 – Mastic Soil and Surfaces
- Building 6 – Mastic, Sediment Soil and Surfaces
- Building 7 – Concrete Sediment and Soil
- Building 8 – Sediment and Soil
- Building 10 – Soil
- Northeast Parking Area – Soil
- Railroads – Soil
- Roadways – Soil
- Sewer System – Sediment Soil and Wastewater
- Groundwater

The following table summarizes the total number of samples analyzed for all media and for each group of compounds within each Investigation Area and the Regional Background samples with a Site wide total including the Regional Background samples

	Analysis Type																
Investigation Area	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals, Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH-DRO	TPH-GRO	VOC
Building 1							69	70		33	56				15	15	33
Building 2	31			70			56	56		36	126				33	33	56
Building 4							28	28		30	51	27			6	6	28
Building 5					32		32	32		35	36	32			3	3	32
Building 6					28		31	30		31	35	29		2	3	3	30
Building 7							44	44		44	46				4	4	44
Building 8							61	61		62	61				27	25	62
Building 10		17													21	17	0
Northeast Parking Area							24	24		25	24						24
Railroads							33	33		33	33						37
Roadways					12		96	99		98	96						98
Sewer				1			127	127		2	128			123	132	128	127
Groundwater			4		13	4	13	13	13	13	13	13	13	13			13
Regional Background							10	10		10							
Site Wide Total	31	17	4	71	85	4	624	627	13	452	705	101	13	138	244	234	584

0 4 CONCLUSIONS

This section summarizes of the nature and extent of the contamination identified at the Site the fate and transport of that contamination and the conclusions from the investigation An assessment of additional data required to characterize any of the Investigation Areas on the Site the property area type finding under the Environmental Baseline Survey (EBS) process and a statement of the Investigation Areas that will be addressed in the Baseline HHRA are also presented

0 4 1 Building Materials and Product Samples

The following discussions summarize the results from building materials and products that were sampled and analyzed during the SSEBS investigation

- **Asbestos** None of the furnace foundation refractory bricks in Building 2 had asbestos results above the screening level Therefore these materials are not considered asbestos containing materials (ACM) and do not require further action
- **Concrete**
  - Polychlorinated biphenyls (PCBs) were detected in 76% of the concrete samples collected Site wide however only one sample in the northwest corner of Building 2 had a concentration above the screening level Because Risks associated with concrete surfaces cannot be readily quantified using standard risk assessment protocols concrete contamination will not be addressed quantitatively in the Baseline HHRA Depending on the future uses of the Site additional studies may be warranted to define the extent of PCB contaminated concrete in Building 2 to either remove or isolate the area of contaminated material
  - Total petroleum hydrocarbons – diesel range organics (TPH DRO) was detected at a concentration over ten times the soil screening level in Building 7 from the only sample analyzed for total petroleum hydrocarbons (TPH) This area of concrete may require further action once future uses for the Site and this building are established
- **Mastic** The mastic beneath the flooring in Buildings 5 and 6 has detectable concentrations of PCBs however since the concentrations were below the screening level no further action is required
- **Wipe Sample (Duct)** The wipe sample collected from the HVAC ductwork in Building 6 had detections of twelve metals sixteen semi volatile organic compounds (SVOCs) and four volatile organic compounds (VOCs) No screening levels or regulatory guidance is available for these compounds detected in surface wipe samples however further action may be required once future uses for the building are determined
- **Product Samples** PCBs were detected in one of the two product samples collected in Building 2 but at a concentration below the screening level and therefore are not defined as PCB containing wastes and no further action is required

0 4 2 Sewer System

Contaminants found in the sewer system present a unique situation The U S Environmental Protection Agency (EPA) Region IX and Missouri Department of Natural Resources (MDNR) did not establish the screening levels used in this SSEBS for sewer sediment and wastewater samples but rather for soil and tap water (EPA) or groundwater (MDNR) respectively Therefore the detections above the screening levels serve only as an indication of contamination that may be present in potential releases from the sewers

The following compounds were detected in the sewer sediments and wastewater on the Site at concentrations above the soil or water screening levels

- Dioxins
- Antimony
- Arsenic
- Cadmium
- Chromium
- Copper
- Lead
- Mercury
- PCBs
- Ten different polynuclear aromatic hydrocarbons (PAHs)
- Two other SVOCs (benzidine and di n octylphthalate)
- TPH DRO
- Nine different VOCs (1 1 1 trichloroethane (1 1 1 TCA) 1 1 dichloroethane (1 1 DCA) 1 2 dichloroethane (1 2 DCA) 1 4 dichlorobenzene CA, carbon tetrachloride (CT) methylene chloride TCE and vinyl chloride (VC))

The contaminants found in the sewer system sediments and wastewater do not appear to have an immediate means of transport to impact the soils and groundwater on the Site These contaminants may continue to dilute and mobilize downstream in the sewer system during precipitation events or if operations generating wastewater are reconnected to the sewer system Only arsenic was detected above the screening levels in both the sewer sediment or wastewater samples and in nearby soil samples Based on the analysis of the data collected for the SSEBS, all data have been collected to characterize the nature and extent of contamination in all of the Investigation Areas in accordance with the FSP Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of localized contamination in and directly beneath the sewer system and sewer trenches The vertical extent of contamination may also require additional studies in borings where contamination exceeded the Screening Levels in the deepest sample from that boring

0 4 3 Soil

The following discussions summarize the nature and extent compounds detected at concentrations above the screening levels in the soils on Site as well as conclusions regarding the contaminant fate and transport

- Dioxins were only analyzed in samples designated to assess contamination in the Building 2 Investigation Area Dioxins were detected at concentrations above the screening levels in twenty nine samples throughout the soils under Building 2 However none of the thirty samples collected from ten to twenty feet outside the building foundation had dioxin concentrations above the screening level
- PCBs were detected at concentrations above the screening levels in seven samples in the Investigation Areas for Buildings 1 2 and 7
- 4 4 Dichlorodiphenyldichloroethene (4 4 DDE) (a pesticide) was detected at a concentration above the screening level in one sample in the basement soil under Building 5 and 4 4 dichlorodiphenyltrichloroethene (4 4 DDT) (also a pesticide) was detected at concentrations above the screening level in three samples in the basement soils under Buildings 5 and 6
- Nine different PAHs were detected in twenty two soil samples at concentrations above the screening levels from the Investigation Areas for Buildings 1 4 5 7 and 8 the Northeast Parking Area the Roadways and the Sewer System
- The dioxins PAHs PCBs and pesticides found in the soils should be mostly sorbed to the soil particles These compounds are not readily soluble in water and therefore are not expected to migrate into the groundwater except where they are co located with organic solvents such as oils (TPH) since these contaminants can dissolve into these solvents and become more mobile in the subsurface soils
- The following six metals were detected on the Site at least once at concentrations above the screening levels
  - Antimony was detected once in the Roadways Investigation Area west of Building 1 and south of Building 8
  - Arsenic was detected in all but one of the 584 soil samples including two detections above the screening level once each in the Investigation Areas for Building 1 southeast of the building and the Sewer System north of Building 2 It was also detected above the screening level in all thirteen groundwater samples These findings indicate more of a natural background condition rather than a Site contaminant therefore arsenic transport is not of environmental concern as it is relatively ubiquitous in the vicinity of the Site
  - Beryllium was detected in all 583 soil samples collected at the Site and above the screening level in forty samples collected from the following Investigation Areas Buildings 2 4 6 and 7 Railroads Roadways and Sewer System As with the arsenic these findings indicate more of a natural background condition rather than a Site contaminant therefore beryllium transport is not of environmental concern as it is relatively ubiquitous in the vicinity of the Site

- Copper was detected once in the parking area west of Building 1
- Lead was detected once each in the Investigation Areas for Building 2 (northwest corner of the building), Building 5 (just east of the tunnel entrance to Building 3) and Building 7 (south of the former cooling tower location)
- Mercury was detected at concentrations above the screening level in four samples collected from the basement in Building 6 Mercury is more mobile than other species of metals due to its liquid state at ambient temperatures However the localized area of the contamination minimizes the potential for groundwater movement and other means of transport
- The antimony copper and lead are assumed to be mostly sorbed to the soil particles based on their characteristics and should not pose a concern unless disturbed

- TPH DRO was detected in seven samples in Building 2 one sample along the pipe trench in the Building 8 Investigation Area and three samples from the Sewer System Investigation Area Two of the three Sewer System samples were from within the Building 10 Investigation Area and the third was along the railroad line northeast of Building 10 and southeast of Building 1 This contamination may continue to migrate through the soils via gravity and localized perched groundwater movement The effects of dispersion and microorganisms may assist in reducing the concentrations available for transport

The Baseline HHRA will evaluate the risks associated with each compound detected above the screening levels except TPH DRO results, sewer soil samples collected below 11 feet below ground surface (bgs) and sewer soil samples that do not initiate a hotspot analysis

Soils with TPH DRO concentrations above the screening level will have to be assessed once the future uses of the Site are determined Cleanup Levels for Missouri (CALM) establishes cleanup target concentrations based on the property usage 200 mg/kg for residential 500 mg/kg for commercial and 1000 mg/kg for industrial

Depending on the future uses of the Site additional studies may be required in borings where contamination exceeded the Screening Levels in the deepest sample from that boring

0 4 4 Groundwater

No distinct water bearing units were identified above the shale bedrock on the Site Perched groundwater was present in the silty clay formations and all of the monitoring wells on Site eventually produced sufficient sample volumes for analysis None of the wells produced water with an adequate flow rate to sustain low flow pumping for sampling and all wells were bailed by hand This method yields samples with increasing turbidity with each bailer volume removed from the well Because the water was not filtered some of the contamination summarized below (especially metals and PAHs) may actually be due to compounds sorbed to the suspended matter

The following compounds were detected above the screening levels in the groundwater in a majority of the wells on Site

- Arsenic (all thirteen wells)
- Seven different PAHs (twelve of the thirteen wells all except SWMW 07)

The following compounds were detected above the screening levels in the groundwater in localized areas on Site

- Lead in one well (SWMW 07) in the northern portion of the Northeast Parking Area
- One SVOC 1 2 diphenylhydrazine in the one well (08MW 01) directly north of Building 2
- Four VOCs (1 1 dichloroethene (1 1 DCE) 1 2 DCA CT and chloroform (CF)) in one well (02MW 01) directly south of Building 2

Based on groundwater surface contours developed from the April 30 and May 8 2003 water level readings the groundwater flow on Site is generally to the north on the western portion of the property and to the northeast on the eastern portion of the property 1 2 diphenylhydrazine and the VOCs are soluble and may migrate over time however groundwater flow rates are expected to be low due to the low permeability of the clay soils These assumptions are supported by the findings that the VOCs in 02MW 01 were not detected in the four new wells installed generally downgradient from 02MW 01 except for 1 1 DCA which was detected below the screening level in 08MW 02

A water supply well on the Site would not be feasible due to the low water yield experienced during sampling activities Also the City of St Louis has an ordinance prohibiting the use of private water supply wells within the city water distribution area The perched groundwater on Site will be assessed in the Baseline HHRA for exposure of future construction workers that may come in contact with the water through excavation activities

Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of localized contamination in the groundwater

0 4 5 Investigation Areas Requiring Additional Data

Based on the analysis of the data collected for the SSEBS all data have been collected to characterize the nature and extent of contamination in all of the Investigation Areas in accordance with the FSP to satisfy the SSEBS and Baseline HHRA in support of the FOSET process For each Investigation Area the type location and number of samples collected meets the Data Quality Objectives defined in Section 3 of the FSP Depending on the future uses of the Site and the risk management decisions additional studies may be warranted to further evaluate the possibility of contamination in the following areas

- PCB contaminated concrete in Buildings 1 2 4 & 5
- Localized contamination in and directly beneath the sewer system and sewer trenches
- The vertical extent of contamination in borings where contamination exceeded the Screening Levels in the deepest sample from that boring
- Asbestos and lead based paint contamination throughout the buildings
- Waste characterization prior to waste disposal

- Characterization of potential contamination below the deadman pads for the former Building 10 USTs

0 4 6 Investigation Areas to be Addressed in the Baseline Human Health Risk Assessment

The following Investigation Areas will be addressed in the Baseline HHRA because there was one or more compounds detected above the screening levels in the soil or groundwater

- Building 1
- Building 2
- Building 4
- Building 5
- Building 6
- Building 7
- Building 8
- Northeast Parking Area
- Railroads
- Roadways
- Groundwater

A number of potential hotspots will be evaluated as part of the HHRA The potential hotspots are relatively small areas where known or suspected releases may have occurred These hotspot areas typically cover a small fraction of the area covered by their respective Investigation Areas Example hotspots would include locations where either the Comprehensive EBS or SSEBS investigation found chemicals present above the screening levels These hotspots will be individually evaluated in the risk assessment

The Investigation Area for Building 10 will not be addressed in the HHRA because only TPH DRO contamination was identified above the screening levels and there are no established risk characteristics for these compounds For the Sewer System Investigation Area the only soil samples to be addressed in the Baseline HHRA hotspot analyses will be the isolated samples collected at depths less than 11 feet bgs containing contaminants at concentrations exceeding the Screening Levels

1 1 PURPOSE OF REPORT

The purpose of this Site Specific Environmental Baseline Survey (SSEBS) is to document the environmental condition of the St Louis Army Ammunition Plant (SLAAP) herein referred to as the Site including the nature type and extent of contamination The Baseline Human Health Risk Assessment (HHRA) which will be submitted under separate cover will provide an assessment of the risks posed to human health posed by such contamination including the potential for future releases Finally this SSEBS and the HHRA will support the Army in the Finding of Suitability to Transfer (FOST) determination process in accordance with American Society for Testing and Materials (ASTM) Method D 6008 96 Standard of Practice for Environmental Baseline Surveys and ASTM Method E 1527 97 Standard Guide for Environmental Site Assessments Phase II Environmental Site Assessment Process (ASTM 1998)

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1 2 REPORT ORGANIZATION

This report is generally organized according to the suggested outline in the U S Environmental Protection Agency (EPA) guidance for conducting as RI/FS (EPA 1988) except that the HHRA will be submitted as a separate document

Section 1 3 includes a brief description and history of the Site including results from relevant previous investigations Section 1 4 provides description and history of each individual investigation area Section 2 0 Site Specific Investigations is structured similarly to the Field Sampling Plan (FSP) Part I of the Sampling and Analysis Plan (SAP) (URS 2002) The descriptions are organized by investigation areas and include location and quantity of samples and any deviations from or elaboration to the detail provided in the FSP Section 3 0 provides background data and information about the Site from literature sources on topography geology hydrogeology climate ecology and land use Section 4 0 discusses the analytical results for the samples collected in each Investigation Area Section 5 0 assesses the potential routes for contaminant migration and describes the persistence and mobility of selected contaminants Section 6 0 summarizes the findings from Sections 4 0 and 5 0 and contains the conclusions Section 7 0 cites the various publications referenced in this report

Tables include summaries of chemical analyses organized by study area and sample medium and are limited to analytes that were detected at least once in each study area and sample medium Drawings depict areas of interest and sampling locations for each investigation area All

appendices are included on the enclosed CD in electronic PDF format Figures from the Comprehensive Environmental Baseline Survey (EBS) conducted by Tetra Tech EM Inc are included in **Appendix A** **Appendix B** contains records of meetings and teleconferences conducted during the field events All sample results are presented in **Appendix C** Boring logs are included in **Appendix D** **Appendix E** contains test pit log records **Appendix F** presents photographs of sample locations and site features **Appendix G** defines the sample identification system used to label all of the samples collected as part of the SSEBS investigation

1 3 SITE BACKGROUND

1 3 1 Site Description

General Site Layout from 1941 to 1944

Appendix A, Figure 6 1 shows SLAAP s north property boundary when it was part of the St Louis Ordnance Plant (SLOP) from 1941 through 1944 SLAAP s north boundary ended along the north side of the train tracks that served former Building 202 ABC (now Building 3) In the extreme northwest area the property boundary extended approximately 280 feet north to accommodate a parking area measuring approximately 360 by 280 feet Except for a guard house (Guard House 209 E) no buildings or manufacturing activities appeared to have occurred at areas north of the railroad train tracks that ran north of Building 3 Residential housing units were located to the north of the SLOP property

The small arms ammunition (30 caliber) production unit was comprised of a 30 caliber production building (Building 3) a 30 caliber loading building (then referred to as Building 202D now Building 5), a 30 caliber primer insert building (then referred to as Building 202E now Building 6) and a powder canning building (then referred to as Building 202F and later converted to the acetylene production (Building 9) now demolished) Other buildings included the powder storage building (Building 202H now demolished) oil storage buildings 202 J and 202 K (now demolished but originally located south of Buildings 5 and 6 respectively) Guard Houses 209 and 209 F and Building 236 D Guard House 209 was located on the northeast area of the property on Riverview Boulevard Guard House 209 F was located at the northwest parking area entrance Building 236 D was a fire equipment garage which is now adjacent to the SLAAP Compressor Building (Building 4)

Underground tunnels connect Building 6 to Building 3 Building 5 to Building 3 and Building 6 to the former SLOP Building 203 which is now part of Triad Manufacturing These underground tunnels were used to extend high pressure steam treated de ionized water and other utilities from SLOP s centralized service center to the SLAAP buildings

General Site Layout after 1944

Appendix A, Figure 6 1 depicts the site layout of the SLAAP facility for the post 1944 operational periods A total of eleven buildings were utilized in primary production and support roles Five of these buildings were retrofitted from 30 caliber manufacturing operations to accommodate 105 millimeter (mm) Howitzer shell production (Buildings 3 5 6 and 9) The remaining buildings (Buildings 1 2 4 7 8 10 and 11) were constructed in 1944

Primary manufacturing operations were conducted in Buildings 1 through 3 Building 1 housed billet cutting operations Building 2 served as the forging center and Building 3 contained the machining operations Support functions to manufacturing operations were provided by Buildings 4 through 11 Building 4 contained air compressors Buildings 5 and 6 provided office and laboratory space Buildings 7 and 7A cooled non contact waters used during manufacturing Buildings 8 (fuel oil tank farm) and 8A (fuel oil tank pump room) delivered fuel to the rotary furnaces in Building 2 Buildings 9 and 9A through 9D generated acetylene and housed an oxygen converter and receiver all in support of Building 1 operations Building 10 stored and supplied quench oil to Building 3 heat treating operation and Buildings 11 11A and 11B generated foamite to support fire suppression efforts **Appendix A, Figures 6-5** through **6-13** show the locations of major equipment areas in each of the buildings

Following conversion to 105 mm Howitzer shell production in 1944 a total of 2 500 000 shells were produced for World War II until the plant was placed on standby in September 1945 Operations were reactivated on March 25 1951 by the Chevrolet Motor Division to support the Korean Conflict From 1951 to 1954 the plant produced 19 094 325 shells Plant operations were terminated on May 1 1954 and SLAAP was placed on interim maintenance status In 1966 the Chevrolet Motor Division reactivated the plant to support the Vietnam War Production began in November 1966 and continued through December 1969 The production rate reached 600 000 shells per month shortly before operations were terminated In total the plant had produced a total of 23 878 646 shells in all three runs (USATHMA 1979)

Wastewater discharges from SLAAP were monitored periodically by the Metropolitan St Louis Sewer District and discharges were in compliance with applicable city ordinances Solid wastes and some liquid wastes were removed from SLAAP for off site disposal and recycling by a local contractor (USATHMA 1979)

1 3 2 Site History

SLOP was constructed in 1941 as a 276 acre small arms ordnance plant that produced 30 and 50 caliber munitions In 1944 21 05 acres in the northeast portion of SLOP were converted from small arms munitions production to 105 mm Howitzer shell production and this portion was designated as SLAAP Additional land was acquired on the north side of SLOP (see **Appendix A, Figure 6-1**) Currently the SLAAP property contains seven unoccupied buildings that were used to house SLAAP s main operating processes See **Figure 1-1** for original and present site boundaries

After World War II SLAAP was placed on standby status It was reactivated from November 1951 to December 1954 and again from November 1966 to December 1969 to support 105 mm Howitzer shell production The plant was maintained and operated by the Chevrolet Shell Division of General Motors from 1951 until 1958 by the U S Defense Corporation from 1958 to 1966 and by the Chevrolet Motor Division of General Motors from 1966 until 1972 when Donovan Construction Company was awarded the maintenance and surveillance contract

In 1984 buildings at SLAAP were renovated to house filing and administrative operations by more than 500 personnel from the U S Army Aviation Systems Command (AVSCOM) From 1986 to 1990, SLAAP was under the command of the U S Army Armament Munitions and Chemical Command (AMCCOM) In 1989 the Department of the Army determined that SLAAP was no longer required to support its munitions mission and most industrial equipment

was removed from the plant In 1990 plant ownership and control were placed under the U S Army Aviation and Troop Command (ATCOM) As of 1993 SLAAP maintenance and surveillance activities were being subcontracted by Donovan Construction Company to Plant Facilities and Engineering Inc (PFE) From 1998 to the spring of 2003 SLAAP was vacant and under the control of U S Army Aviation and Missile Command (AMCOM) BRAC became the responsible party for the Site in the spring of 2003

1 3 3 Summary of Production Processes

Manufacturing Processes from 1941 to 1944

The 30 caliber ammunition round consists of a brass cartridge case a projectile powder and a primer Manufacture of the cartridge case began with a brass cup The cup was shaped through a series of cold forming operations including drawing and other shaping processes The brass was annealed (heated evenly while maintaining the heat level) at various times during the shaping process to eliminate metal stresses caused by the drawing operations The brass was also pickled (treated with sulfuric acid) to remove metal oxides Lastly the brass was washed and dried to remove the sulfuric acid and associated moisture

Procedures for fabricating the projectile were similar to those used to shape the cartridge case Each projectile had a copper jacket shaped through a series of drawing and shaping processes similar to those employed during production of the cartridge case A lead core (produced elsewhere) was inserted into the copper jacket (ball ammunition) in bullet assembly machines Armor piercing rounds contained hardened steel cores instead of lead cores

Smokeless powder and primer (both produced elsewhere) were added to complete the round A primer cup containing an initiating explosive such as lead styphnate was added to the base of the cartridge case after the case was pierced and waterproofed with a varnish (shellac) This operation took place at what is now Building 6 A small quantity of smokeless powder was loaded into the cartridge case and the projectile was assembled and crimped The loading assembling and crimping operations were conducted at what is now Building 5

Appendix A, Figures 6-2 and **6-3** show the areas in Building 3 where specific 30 caliber ammunition manufacturing operations took place on the first and second floors respectively **Appendix A, Figure 6-4** shows the locations of manufacturing operations within Building 5 and 6 Each of these process areas as well as those support processes conducted in Buildings 202 F J and K are discussed in detail in **Section 1 4** General areas of manufacturing processes are shown in **Figure 1-2**

Manufacturing Processes after 1944

In 1944 SLAAP facility operations converted from 30 caliber ammunition to 105 mm Howitzer shell production After producing 2 500 000 shells for World War II the plant was placed on standby in September 1945 The Chevrolet Motor Division reactivated it on March 25, 1951 From 1951 to 1954 the plant produced 19 094 325 shells Plant operations were terminated on May 1 1954 and SLAAP was placed on interim maintenance status In 1966 the Chevrolet Motor Division reactivated the plant Production began in November 1966 When operations were terminated in December 1969 the plant had produced a total of 23 878 646 shells in all

three runs (USATHMA 1979) The production rate reached 600 000 shells per month shortly before operations terminated

Appendix A, Figures 6-5 through **6-13** show the locations of major equipment areas in Buildings 1 through 8A and 11 11A and 11B associated with 105 mm Howitzer shell production Existing Buildings 202 ABC 202 D 202 E 202 F and 202H were retrofitted to accommodate 105 mm Howitzer shell production and were designated Buildings 3 5 6 and 9 (202 F and 202 H) respectively In addition Buildings 1 2 4 7 7A 8 8A 10 11 11A and 11B were built in 1944 to support 105 mm Howitzer shell production Equipment layout after 1944 is shown in **Figure 1 3** for all existing buildings

1 3 4 Previous Investigations

The Comprehensive EBS (Tetra Tech EM Inc (TTEMI) 2000) was completed in general accordance with ASTM Method D 6008 96 Standard of Practice for Environmental Baseline Surveys and ASTM Method E 1527 97 Standard Practice for Environmental Site Assessments Phase I Environmental Site Assessment Process

A record search and initial site visit was conducted as part of the Comprehensive EBS to identify possible areas of environmental concern at SLAAP The record search indicated that a Notice of Noncompliance (NON) was issued by EPA Region VII to SLAAP for polychlorinated biphenyl (PCB) contamination in Building 3 Records also indicate that underground storage tank (UST) removals at SLAAP had not been completed in accordance with Missouri Department of Natural Resources (MDNR) requirements Possible site wide areas of environmental concern consist of contamination resulting from possible contaminant migration from the PURO Chemical Division (PURO) storage facility (formerly part of SLOP) located south of the installation as well as friable asbestos containing materials (ACM) lead based paint (LBP) and PCBs contained in original fluorescent light ballasts found at SLAAP

The following building specific possible areas of environmental concern were identified through the records reviewed and the initial site visit of the Comprehensive EBS

- Electrical equipment in Buildings 1 2 and 4 have oils suspected of containing PCBs
- Spilled oil was identified in Buildings 1 2 3, and 5
- Concrete filled hydraulic oil pits sumps and floor drains were identified in Building 1
- Two pits connected to the sewer system were observed at Building 1
- Debris was present throughout Buildings 1 2 and 4
- Building 2 contained subgrade pipes for distributing hydraulic oil with PCB s
- Soil near the chip chute in the basement of Building 3 is suspected of containing PCBs and pesticides
- Oil staining was present along the far east foundation wall on the floor and on support columns in the vicinity of the quench oil pump room in the basement of Building 3
- Suspect ACM and suspect PCB contaminated metal shavings were observed on the basement floor of Building 3

- A steel separator tank was identified in the south central portion of the basement of Building 3 The tank was filled with a dried oxidized material This material may be of environmental concern Other pieces of equipment were located in the basement
- Cracks in the PCB remediated concrete cap were observed on the first floor of Building 3
- Paint used to seal the steel structures on the first floor of Building 3 was cracking and peeling
- A solvent room with a drain connected to the sewer system was identified in Building 3 plans
- A room on the second floor of Building 3 contained an emergency power supply unit This unit may contain lead acid or nickel cadmium batteries
- A remote quench oil fill pipe was located near the northeast corner of Building 3
- The compressor pits in Building 4 are suspected of containing compressor oils with PCB s
- Ash was observed in a hearth in Building 6
- The aboveground storage tanks formerly present at Building 8 east of Building 2 are suspected of having leaked and spilled fuel oil
- USTs have not been officially closed, and may present a possible environmental concern

Phase I EBS results were presented to the MDNR and EPA Region VII on April 23 1999 The Phase I results were used to develop a scope of work that included completion and sampling of soil borings installation and sampling of monitoring wells wipe sampling surface soil sampling concrete core sampling and an ACM survey The scope of work for investigating the aforementioned possible areas of environmental concern was coordinated between TTEMI and AMCOM and verbally endorsed by EPA Region VII and MDNR

Phase II EBS activities were completed in two separate sampling events The first Phase II sampling event identified areas of contamination and the second Phase II sampling event was performed to further assess and characterize these areas During a meeting held at the EPA Region VII offices in Kansas City Kansas on September 9 1999 the results from the first Phase II sampling event were reviewed to assess additional areas to investigate address PCB sampling to resolve the outstanding PBC NON and additional locations to sample to address the unresolved outstanding UST cleanup The first Phase II results were reviewed site wide and building by building The scope of work for the second phase of the Comprehensive EBS Phase II was developed and work was undertaken based on the outcome of the September 9 1999 meeting The data collected during Phases I and II were used to compile the results of the EBS The draft final Comprehensive EBS report was submitted for review on March 17 2000 and a meeting to review the report took place on March 31 2000 at the EPA Region VII offices During that meeting the draft final Comprehensive EBS report was briefly reviewed It was agreed that additional information was required primarily related to

1 manufacturing activities that took place at SLAAP when it was part of SLOP
2 the Comprehensive EBS analytical data validation report performed by IT Corporation was necessary to assess the validity of the analytical results obtained during the EBS

3 the cleanup criteria used for comparison of analytical results should not be limited to the Cleanup Levels for Missouri (CALM) (MDNR 2001) but should be expanded to incorporate other cleanup criteria including the EPA Region IX Preliminary Remediation Goals (PRGs) (EPA 2002)

The revised final Comprehensive EBS report dated December 28 2000 incorporated the additional information requested at the March 31 2000 meeting The conclusions and recommendations are presented in the Comprehensive EBS report dated December 28 2000 and are summarized in **Table 1-11**

EPA Region VII and MDNR provided comments to AMCOM on the revised final Comprehensive EBS report TTEMI prepared preliminary draft responses to both EPA Region VII and MDNR comments which were reviewed during a May 17 2001 meeting held in St Louis Missouri Attendees to this meeting included representatives from AMCOM and its contractor Titan Systems Corporation SEMCOR Division (SEMCOR) EPA Region VII MDNR CENWK URS Arrowhead Contractors Inc and TTEMI After this meeting AMCOM undertook the task of documenting the outcome of the review comments and addressing the comments that were not proposed to be deferred to this SSEBS The minutes of this meeting (SEMCOR 2001) indicated the following remaining areas of concern for the SSEBS

Site Wide

- Areas where EBS mentions areas of environmental concern
- Comprehensive look at sewer system
- UST areas
- Transformer areas
- Metals storage areas
- Sumps

Building 1

- Sumps
- Soils around break machines inside
- Subsurface under building PCB total petroleum hydrocarbons (TPH) solvents

Building 2

- Subsurface under building TPH Semi Volatile Organic Compounds (SVOCs) PCBs solvents (sample in grid pattern)
- Sediment in manhole solvents

Building 3

- Catch basins basement of Building 3
- Soils in basement of Building 3
- Under floor of east end of Building 3
- Area with high gasoline hit near UST next to Building 3
- West end of Building 3 for solvents in water
- Elevator

Building 4

- Sumps compressors

Buildings 5 and 6

- Lab
- Dark room
- Elevator
- South of buildings small storage areas

Former building 8

- Pipe chase connecting to Building 2

1 4 INVESTIGATION AREAS BACKGROUND

This section presents an overview of the manufacturing activities conducted at the site as reported in the Comprehensive EBS report Since construction of the facility in 1941 SLAAP has supported two primary production missions First several of the SLAAP buildings were utilized in support of 30 caliber munitions production as part of SLOP operations from 1941 through 1944 Second SLAAP was utilized to produce 105 mm Howitzer shells during intermittent operation phases from 1944 through 1969 Accordingly an overview of each of the production missions is presented in the following subsections with respect to general site layout summary of the product processes and building descriptions **Tables 1-1** through **1-10** provide a summary of the operational information with respect to both production missions for each of the SLAAP buildings

1 4 1 Building 1

Manufacturing Processes from 1941 to 1944

Building One was constructed in 1944 to support the 105 mm Howitzer shell production No structure existed at this location during SLOP operations

Manufacturing Processes after 1944

Steel billets were stored in concrete and H beam racks outside of the eastern and western steel yards next to Building 1 (see **Appendix A, Figure 6 5**) Long 4 inch square steel billets or bars were fed into the building via conveyor systems to four nicking machines (two on the east and two on the west sides) Each nicking machine consisted of eight oxygen assisted acetylene torches that would create a nick approximately 1/4 deep and 3/16 wide along the width of each bar Following nicking conveyor feeds would move the billets through a direct contact water cooling process to eight breaking machines (each rated for 530 slugs per hour) The breaking machines were situated inside concrete pits that drained to the south of the building into the sewer system Billet ends from each end slug were cut to size in cold saw machines Snag grinding as necessary was completed on all breaks that did not meet specifications Dust collectors with vent hoods were located directly above the nicking machines and directed fumes and fine metallic particulates into dust collectors located inside the building Ventilators were

located next to the saw and grinding machines Liquid wastes were pumped to the facility sewer system (USATHMA 1979) Following inspection the finished 8 1/2 slugs were mounted on skids and transported to the forge building (Building 2)

1 4 2 Building 2

Manufacturing Processes from 1941 to 1944

Building Two was constructed in 1944 to support the 105 mm Howitzer shell production No structure existed at this location during SLOP operations

Manufacturing Processes after 1944

Building 2 (**Appendix A, Figure 6-6**) served as the forge building Building 2 housed a total of 10 rotary furnaces 5 were combination natural gas and oil fired rotary furnaces and 5 were oil fired furnaces for slug heating and forging The inside of the building was almost symmetrically configured with five rotary furnaces on each side of the building The cut billets were received from Building 1 and fed into the rotary furnaces Each furnace was equipped with a rectangular skid conveyor that transferred the hot billet to the sizing and descaling units The billets were then transported to the piercing presses where a cup was first formed through hydraulic force Two piercing presses served each rotary furnace Following piercing the billets were then transferred to the hydraulic presses and draw benches where they were drawn through a series of progressively smaller ring dies After drawing the formed billet was inspected and cut to length at the hot cut off machine One cut off machine was present at each rotary furnace unit The shells were then transferred by the air cooling conveyor to the water quench tanks A descaling tank was located in the middle western half of the building After cooling the shells were mechanically conveyed to the second floor of Building 3 by an elevated covered bridge that connects these two buildings

Hydraulic accumulators (one on each side of Building 2) were utilized to supply hydraulic oil to the forging process Each hydraulic accumulator consisted of 10 hydraulic pumps connected to an above ground 5 000 gallon oil tank in the middle section of the building Natural gas was supplied by an underground utility supply system No 6 fuel oil was supplied by Buildings 8 and 8A through underground fuel lines Each furnace had a dedicated oil fuel line that came down from the overhead distribution line attached to an I beam next to the furnace

Electrical transformers and equipment were housed in two enclosed elevated mezzanines located in the bays between the walls and the first I beam row inside the building

1 4 3 Building 3

Manufacturing Processes from 1941 to 1944

First Floor

For ease of reference text discussing the layout of Building 3 will cite locations of alphanumeric building I beams and columns as originally designated in record drawings as shown in

Appendix A, Figures 6-2 through **6-4** This grid system designates the furthest north I beam row as Row A The I beam number 1 is designated as the furthest west I beam Row Thus I beam B2 is the second I beam from the north end of the building and the second I beam from the building s west wall

Materials were received at the loading dock between I beam Rows A and B and Rows 1 through Row 11 where a 3 ton hoist unloaded case cups ball jackets armor piercing jacket coil stock and other raw materials Raw materials were stored either in the southwest corner of the building between I beam Rows H and L and 2 and 5 or at the coil stock storage area between I beam Rows 4 and 10 and C and G

Coil reels were fed to either seven jacket blank and cup machines or to four base blank and cup machines located in the aisles between I beam Rows 9 and 11 and C and H Nine first draw machines and 11 second draw machines were installed in the aisles between I beam Rows 11 and 13 and B and H Twenty eight bump machines were aligned in pairs between I beam Rows 13 and 14 and B to H A soap mixing room with two mixing systems was located in a room at I beam Row 13 between I beams A and B The soap was used in pickling operations on the second floor Fourteen third draw machines and 10 first trim machines were located along the aisle between I beam Rows 14 and 15 from Rows B through H Nineteen first draw machines were located east of I beam Row 15 between Rows B and H Eighteen fourth draw machines were located next to I beam Row 16 nine on the east and nine on the west side of I beam Row 16 between Rows B and H Twenty nine second trim machines nineteen on the west and ten on the east were located along I beam Row 17 between I beams B and H Thirty pocketing machines were located along I beam Row 18 between Rows B and H The aisle between Rows 19 and 20 was occupied by 30 heading machines arranged in a similar fashion as the pocketing machines between I beam Rows B and H

A second loading dock was located between I beam Rows 15 and 17 west of the electrical transformer vault between I beam Rows A and B Scrap salvage including a baler system was located in a room confined between I beam Rows A and B and Rows 17 and 21

Open corridors or aisles were maintained between I beam Rows B and C and between I beam Rows G and H throughout the first floor of Building 202 ABC A maintenance area and a tool and machine shop were located west of the storage area between I beam Rows 5 and 9 from I beam Rows H to L

Six Salem annealing furnaces each equipped with independent turbo compressors product elevators and quench tanks were located between I beam Rows 10 to 17 on the south side of the building The product to be annealed was fed from the second floor through rectangular hoppers located on the north side of the furnace that connected directly to the annealing furnace drive system The product was then quenched and transferred to the second floor by elevators located south of the furnaces

South of I beam Row K between I beam Rows 17 and 20 were 27 jacket trim machines 23 for ball jackets and four for armor piercing jackets Twelve jacket first draw machines nine dedicated for ball jackets and three for armor piercing jackets were located south of I beam Row H between I beam Rows 17 and 20 Twelve jacket second draw machines were located north and south of I beam Row J between Rows 17 and 20 Eighteen jacket third draw and three

jacket fourth draw machines were located in the aisle between I beam Rows J and K and Rows 17 through 20

An air compressor room was located between I beam Row 24 and 25 and A and B Loading docks were located in the open bay between I beam Rows A and B from Rows 26 to 32 and from I beam Row 34 to the east end of the building

Cup manufacture began in the bay between Rows 21 and 23 and C through G Up to 47 head turning machines (16 west of I beam Row 22 and 31 in the aisle between I beam Rows 22 and 23) were mounted on benches Spiral chutes and elevators on the north and south ends transferred product between the first and second floors Three vibrating feeders fifteen body annealing furnaces and an elevator were located just east of I beam Row 23 from I beam Rows C through G

Twenty nine taper and plug machines were located east and west of I beam Row 24 These machines received product from two spiral chutes located next to I beam C24 via feeders and belt conveyors Product from the taper and plug machines was transferred to a belt conveyor located at floor level that discharged to the product elevator located near I beam G24

Twenty five finishing and trimming machines were located along I beam Row 25 A spiral chute fed product from the second floor to a vibrating feeder The vibrating feeder discharged to a feed belt conveyor that supplied the finishing and trimming machines The product was then transferred to an elevator located on the north end just northwest of I beam C25

Mouth and neck annealing took place between I beam Rows 25 to 27 and C through G The aisle between I beam Rows 25 and 26 and C through G housed one annealing laboratory Twenty four mouth and neck annealing machines were located in the bay between Rows 26 and 27 Casings were transferred from the second floor by a spiral chute and vibrating and rotary feeders to the mouth and neck annealing machines from the south end The annealing machines discharged the casings to an elevator rotary feeder and feed belt to the 30 final inspection machines located along I beam Row 27 The casings were then transferred to the piercing machines by an elevator located at the south end of the final inspection machines southeast of I beam G27

Fifty bullet assembly machines approximately thirty six for ball bullets and fourteen for armor piercing bullets were located in the area between I beam Rows 22 and 28 south of Row H to the south wall leaving aisle space near the south building wall The finished cartridge storage area was located between I beam Rows B through G through the east end of the buildings An inspection area was located east of the bullet assembly area between I beam Rows 28 to 33 south of Row H A cafeteria with a kitchen and a men s locker room were located at the southeast corner

Second Floor

The west end housed a canteen area with a kitchen storage room fan room and women s and men s locker rooms The canteen was located between I beam Rows B and G and 1 and 8 The locker rooms were located south of I beam Row G from Rows 1 through 9

The same manufacturing operations described for the first floor were supported or performed on the second floor Hoppers transferred cartridge case product from the second floor to the first floor and elevators conveyed product from the first floor to the second floor The hoppers and elevator were located at the blank and cup first draw second draw bump third draw first trim

fourth draw second trim and pocketing and heading machine lines from I beam Rows 10 to 20 between I beam Rows C and G Similarly the bullet jacket draw area included floor hoppers that conveyed bullet jackets to the first draw second draw third draw and fourth draw and jacket trim areas This area was located south of I beam Row H between I beam Rows 17 and 20

Six 2 000 pound Salem picklers were located south of I beam Row H between I beam Rows 10 and 17 Each pickler was equipped with an independent pickling tank with vent system acid rinse cold water rinse hot soap bath hot water rinse and dryer Each pickler was placed within a drainage area with independent floor drains connected to the building sewer system Six floor hoppers fed the Salem furnaces on the first floor The hoppers were located north of I beam Row J between I beam Rows 10 and 17 Two product washers served by a common floor drain were located south of I beams H10 and H11 Two more washers each with a dedicated floor drain were located along the north building wall south of I beams B14 and B17 Two wash and dry machines were located in the cartridge draw area each with independent floor drains One machine was located between I beams C13 and C14 and the other was located south of I beams B18 and B19 Aisle space was maintained in the second floor of Building 202 ABC between I beam Rows 20 and 21 at the north side of I beam Row H and along the south building wall

Seven product washing machines and two drying machines were located between I beam Rows 20 and 22 Two soap mixing machines and five wash barrels were also located in this area between I beam Rows C and E Four head gauge shaker tables were located between the head turning and body annealing lines A roller conveyor on the floor was used to transfer baskets used to feed the Lindberg furnaces located south of I beams C25 and C26 Pickling and rinsing units six wash barrels and two dryers were located in the bay between I beam Rows 25 and 26 from Row D to just south of Row G

Two fuel gas mixing systems were located in a room south of the north building wall between I beam Rows 24 and 25 A washer was south of I beams G24 and G25

The hoppers that fed the 50 bullet assembly machines were located between I beam 22 and 28 south of I beam Row H though the south wall leaving aisle space near the south building wall

After final inspection the cartridge cases were transferred to the Primer Insert Building (Building 6) by an overhead conveyor belt

A 5 day cartridge storage area was located between I beam Rows 29 and 34 and B and F Four cartridge clip assembly units were housed between I beam Rows 34 and 35 and between the north building wall and I beam Row E Forty eight gauge and weight stations were located between I beam Rows 28 to 37 and F and H Five labeling and packing machines with a gravity roller conveyor and spiral chute to the first floor storage area were located between I beam Rows 36 and 39 in the northeast corner of the building Five Inman partition machines were located next to the east building wall between I beam Rows F and H

A loaded scrap salvage area was located between I beam Rows 29 and 31 north of the south building wall Primed cartridges inspection benches were located north of the south building wall between I beam Rows 32 and 34 The inspection layout room was located along the south building wall between I beam Rows 34 and 36 The southeast corner of the second floor was utilized as a women s restroom and locker room

One overhead bridge connects Building 3 to Building 6 via the bridge between I beam Rows 27 and 28 This bridge conveyed cartridge cases from the final inspection line for primer insertion

Manufacturing Processes after 1944

The first and second floors in Building 3 were used for machining operations **Figures 1 7** through **1-10** [EBS Figures 6 7 through 6 10] show areas in Building 3 where major equipment was located in the basement first floor second floor and roof respectively The building housed various lathe operations hydraulic presses conveyors air driven machinery for steel cutting shaping and finishing and metal preservative operations Other equipment included welding machines machine electrical and carpenter shops and a small automotive shop A self contained liquid storage area was located on the first floor that stored various oils solvents and chemicals As of January 1969 the following oils greases and process fluids were used

- MR 186 hot forging compound
- Molyshield grease Alubo
- MX 2 Hi Temperature grease
- Coolex # 25 coolant
- GM 3 Cold hosing compound
- Spindle oil
- Various lubricating oils (Regal Mobil and Shell)
- Hydraulic oil General Motors Specification 16A
- Ecnogrind
- Hot Forging Compound

Process fluids included (USATHMA 1979)

- Thinner (toluol used at a rate of 45 000 liters per month)
- Enamel 1T E 516 (used at a rate of 159 000 liters per month)
- Primer MIL P 223332A (used at a rate of 36 000 liters per month)
- Corrosion preventive phosphoric acid (used at a rate of 2 500 liters per month)

The following table summarizes information pertaining to components of the above listed compounds found through searches of chemical handbooks manufacturer s MSDS and general web searches (including MSN Yahoo Lycos etc)

Oil/Grease/Compound	Metals[1]	VOCs	SVOCs	PCBs	Notes
Hot Forging Compounds MR 186 and others	Possible	Possible	Yes	Possible	
Greases Molyshield Grease Hi Temperature	Possible	Possible	Yes	Possible	
Coolant	Doubtful	Possible	Yes	Possible	
Cold Hosing Compound	Possible	Possible	Yes	Possible	
Various Oils including Spindle Oil Lubricating Oils Hydraulic Oils	Possible	Possible	Yes	Possible	
Ecnogrind	Possible	Doubtful	Likely	Possible	
Toluol Thinner (Toluene)	Doubtful	Yes	Doubtful	No	
Painting Products Enamel 1T E 516 Primer MIL P 223332A	Likely	Yes	Doubtful	No	
Corrosion Preventive Phosphoric Acid	No	No	No	No	H_3PO_4

[1] RCRA Metals – Arsenic Barium Cadmium Chromium Lead Mercury Nickel and Selenium

The following discussion of Building 3 processes is organized to follow the flow of production

Appendix A, Figure 6-9 shows equipment areas on the second floor of Building 3 Fourteen furnaces were located between I beam rows 28A through 43 Rough machining equipment was also located on the second floor of Building 3 Forged shells were put through the bore nose or Sundstrand lathe (between I beam Rows 11A and 14) followed by shot blasting (between I beam Rows 14 and 17) The shells would progress through the machining process from west to east ending at the annealing furnaces at the east end of the building Center lathes were located between I beam rows 18 and 20 and the rough turning gross lathe was located between I beam Rows 21 through 25

Appendix A, Figure 6-8 shows the location of major equipment on the first floor of Building 3 A paint stripping room was located on the east end of the building north of the garage Quench oil tanks used to quench the shells after heat treatment in the annealing furnaces were located west of the paint stripping room Shell washing was conducted before painting which was conducted in paint booths west of the quench oil tanks Shell washing included the addition of phosphoric acid rinsing chromic acid bath prior to painting The paint mixing room was located between I beam Rows 28A and 32 The area outside the paint mixing room stored empty barrels Four paint mixing stations were used inside the paint mixing room Various lathing welding and grinding areas are located between I beam Rows 6 through 24 Grinders shapers mills and lathes are also located between I beam Rows 6 through 9 A hydraulic oil reclaiming unit was located on the north side of the first floor of Building 3 between I beam Rows 10 and 11A and 11 B A soluble oil mixing room was located next to I beam Row 13 between Columns A and B

The basement (**Appendix A, Figure 6-7**) contained four transformer vaults a cable vault elevator pits two quench oil transfer pump systems two former quench oil tanks a former sludge pit and a former gasoline UST The quench oil pumps supplied make up oil from each of

the quench oil tanks A return line located between I beams Columns E and F collected quench oil from the first floor and conveyed it to the quench oil sludge pit to remove particulates and sediment This tank overflowed into the quench oil tank next to the quench oil sludge pit The three quench oil tanks were hydraulically connected The overflow from the oil sludge pit was directed by gravity to the oil tank south of the pit The concrete floor area was located between I beam Rows 9 and 23

The roof of Building 3 contained cooling towers paint room exhaust fans furnace exhaust fans and dust collectors for machining operations performed on the second floor (**Appendix A, Figure 6-10**) The cooling towers served the furnaces and cooled quench oil hydraulic oil and other fluids through cooling water from Building 7

1 4 4 Building 4

Manufacturing Processes from 1941 to 1944

Building Four was constructed in 1944 to support the 105 mm Howitzer shell production No structure existed at this location during SLOP operations

Manufacturing Processes after 1944

Building 4 was the air compressor building Five compressors were connected to ten air intake lines two for each compressor The intake lines were located outside along the south wall of Building 4 **Appendix A, Figure 6-11** and **6 12** show major equipment in the basement and ground level of Building 4 Individual air filter systems were connected to each air intake outside the building The intakes entered the building beneath the floor into the compressors Each compressor was equipped with an intercooler and aftercooler (located in a pit below the floor level) Five air receivers were aligned outside the north wall of Building 4 A cable room and vault are located in the western portion of the basement of Building 4

An electrical room that housed the motor control center for the air compressors and other equipment was located west of the compressor area

1 4 5 Building 5

Manufacturing Processes from 1941 to 1944

Appendix A, Figure 6-4 shows the former manufacturing areas from the first floors of Buildings 5 and 6 Five 30 caliber powder loading assembly and crimping stations (four on the south side and one on the northeast side) were located in Building 5 This building did not have automatic loading machines Four case shakers one at each of the south stations were used to supply cases for powder loading Roller conveyors transferred cases from the case shakers to the powder loading compartment

Four jacket shakers one at each of the south stations were used to supply ball or armor piercing jackets for bullet assembly A second conveyor system transferred loaded cases to just outside the independent assembly compartment where the jacketed bullet was attached to the loaded cartridge case The assembled bullet was crimped at one of the four independent crimping

compartments The cartridges were then identified in one of the four identifying units inspected and conveyed to the second floor of Building 3 for further processing

It appears as if a station at the northeast corner of the building was a non operational spare station This station contained only powder loading assembly and crimping compartments and machines No ancillary conveyor systems tables inspection benches case and jacket shakers or identifying units were present Other equipment on the second floor included the elevator and the conveyor system that brought the product from the first floor of Building 5 to the second floor of Building 3 to the gauge and weight area No other equipment was installed on the second floor of Building 5

Building 202 J

This building was used for oil storage to support the operations at Building 5 The building was 6 feet wide 13 feet long and 8 5 feet high and was constructed on a 12 inch thick concrete slab without drains A maximum of four oil drums could be stored and used at this location

Manufacturing Processes after 1944

Appendix A, Figure 6-13 presents the equipment layout for Buildings 5 and 6 during the 105 mm Howitzer production Building 5 was primarily used for office space It consisted of a two story building with an elevator and restrooms No 105 mm Howitzer shell production took place at this building

1 4 6 Building 6

Manufacturing Processes from 1941 to 1944

Appendix A, Figure 6-4 shows manufacturing areas in the first floor of Building 6 where ten primer invert machines and 36 primer insert machines were located A laboratory equipped with service and primer drop test benches was located in the southeast corner of the building Four of the primer invert machines were located in the middle section of the building two along the south building wall and two along the north wall The other six primer invert machines were located in the extreme southwest corner of the building south of the locker rooms

Thirty six primer insert machines were located along the middle section of the building Cartridge cases were fed from the overhead conveyor belt into a spiral chute located on the second floor and into a vibrating feeder located on the east side of the building A feed belt that ran along the middle section of the building received the cartridge cases and transported them to the primer insert machines which were arranged in pairs one on each side of the feed belt Rectangular chutes transferred the cases to the primer insert machines The primed cases were discharged to a belt conveyor that ran at floor level and in turn supplied an elevator located east of the spiral chute Other than the conveyor system on the second floor no equipment was installed on the second floor of Building 6

Building 202 K

This building was used for oil storage to support the operations at Building 6 The building was 6 feet wide 13 feet long and 8 5 feet high and was constructed on a 12 inch thick concrete slab without drains A maximum of four oil drums could be stored and used at this location

Manufacturing Processes after 1944

Appendix A, Figure 6 13 presents the equipment layout for Buildings 5 and 6 during the 105 mm Howitzer production Building 6 was also used as office space and housed an inspection department and laboratory The laboratory consisted of a chemical department physical department office dark room and chemical storage area A deep etch fume hood was located along the south wall Lockers and restrooms were located in the west end of the building

1 4 7 Building 7

Manufacturing Processes from 1941 to 1944

Building Seven was constructed in 1944 to support the 105 mm Howitzer shell production No structure existed at this location during SLOP operations

Manufacturing Processes after 1944

Appendix A, Figures 6-11 and **6-12** show major equipment at Buildings 7 and 7A Five centrifugal pumps were used in Building 7 to support water and other cooling fluid requirements

1 4 8 Building 8

Manufacturing Processes from 1941 to 1944

Building Eight was constructed in 1944 to support the 105 mm Howitzer shell production No structure existed at this location during SLOP operations

Manufacturing Processes after 1944

Former Buildings 8 and 8A are depicted in **Appendix A, Figure 6-6** Nine No 6 fuel oil tanks were located first north of Building 2 and then relocated in 1958 to the east side of Building 2

1 4 9 Building 10

Manufacturing Processes from 1941 to 1944

Building Ten was constructed in 1944 to support the 105 mm Howitzer shell production No structure existed at this location during SLOP operations

Manufacturing Processes after 1944

Building 10 was a series of tanks installed to increase production of 105 mm Howitzer shells **Appendix A, Figure 6-1** depicts these tanks The three underground quench oil tanks and the quench oil sludge pit were located outdoors in front of the east end of Building 3 and supplied cooling oil (No 6 fuel oil) to 14 quench oil tanks located on the first floor of the east section of Building 3

1 4 10 Northeast Parking Area

This area was originally an open grassy area north of Building One and east of Building Two The area was paved between 1965 and 1968 probably prior to or concurrent with the plant resuming production in November 1966

1 4 11 Railroads

The railroads on the Site served as access to bring raw materials into the plant and haul both 30 caliber ammunition from 1941 to 1944 and 105 mm Howitzer shells after 1944 from the plant The spur lines serving SLAAP appear to be relatively unchanged from 1941 to present

1 4 12 Roadways

Roadways on the Site were constructed at various times throughout the operation of the facility Most of the original roadways consist of approximately 12 inches of high chert aggregate content Portland cement with 3 to 6 inches of asphalt overlay Newer roadways and parking areas constructed after 1944 consist solely of the asphalt portion These areas include portions of the roadway and parking area east of Buildings 3 and 5 the parking areas east and west of Building 1 and the Northeast Parking Area

The current parking area and roadway east of Building 5 cover the locations of former Buildings 9 9A 9B 9C and 9D Background on the processes conducted at these facilities is provided below since sampling to characterize this area will be performed under this Investigation Area

Buildings 9 and 9A, Powder Canning and Storage Buildings (1941 to 1944)

Powder canning and storage took place at Buildings 9 and 9A, respectively Powder containers (15 inch diameter cylinders approximately 2 5 feet tall and weighing 185 pounds) were emptied into rectangular brass hoppers equipped with copper screens that were located within an enclosed wall system designed to contain accidental explosions The hoppers delivered smokeless powder to the canning table via 3 inch copper tubing through a concrete wall The copper tubing was fitted with two quick action valves, one before and one after the concrete wall

Buildings 9 and 9A through 9D, Acetylene Generation Area (after 1944)

The acetylene generation area consisted of the Acetylene Generator Building (Building 9) the Carbide Storage Building (Building 9A) the Sludge Pits (Building 9B) the Oxygen Receiver (Building 9C) and the Drnox Oxygen Converter (Building 9D) The Oxygen Receiver (Building 9C)

was an aboveground storage tank (AST) owned by the oxygen gas supplier **Appendix A, Figure 6-1** depicts the areas where these buildings were located

1 4 13 Sewers

The combined sewer system for the Site was installed during construction of the facility in 1941 and 1944 The system consists mostly of vitrified clay pipe ranging in size from 4 inch floor drains to 18 inch mains Some concrete sections of pipe were installed during subsequent modifications to the Site usually for additional storm runoff control as more of the Site was paved to provide additional parking

1 4 14 Groundwater

There are no known historical uses of groundwater on the Site The original design drawings show plumbing for the city water supply in all buildings The City of St Louis also has an ordinance prohibiting use of wells within the area supplied with city water

Fieldwork for the SSEBS was conducted in two phases the initial event in August/September 2002 and the Contingency Sampling Program (CSP) event in April/May 2003 Sampling activities for the initial event were completed between August 19 2002 and September 20 2002 with various set up and follow up activities occurring during the week preceding and two weeks after the sampling activities Preliminary activities for the CSP commenced on April 28 2003 with sampling activities conducted between May 5 and May 8 2003 Fieldwork was conducted in accordance with the FSP and CSP Addendum to the FSP prepared for the CSP activities (URS 2003) except as noted in the following investigation area specific sections The rationale for sampling in each Investigation Area was established in the FSP and is summarized in this SSEBS in **Table 2-1**

During the SSEBS investigation a temporary field office was set up in Building 5 Power was provided by a trailer mounted 125 kW generator Water for drilling and decontamination was obtained with metering equipment from the City of St Louis Water Division from a hydrant located near the southeast corner of Building 5

As part of the SSEBS sampling activities two methods were utilized for collecting 757 soil samples The majority of the soil borings were advanced by Below Ground Surface Inc (BGS) using a pick up mounted Geoprobe® rig Model 5410 equipped with either a RS60 3¼ interior diameter sampler for the first four feet of boring or a Macrocore 2 interior diameter sampler for deeper borings Soil samples were collected at the prescribed sample intervals using a disposable Teflon liner for each boring Soil samples in building basements or other locations inaccessible to the Geoprobe® rig were collected with stainless steel hand augers Soil samples were collected from depth intervals of 0 to 0 5 feet 4 to 5 feet and 9 to 10 feet below ground surface (bgs) unless otherwise noted in the investigation area specific sections below Ten surface (0 to 0 5 feet bgs) samples were collected using a stainless steel hand auger from two area municipal parks to define regional background concentrations of metals and polynuclear aromatic hydrocarbons (PAHs)

Other portions of the initial investigation at the Site included a sewer survey which consisted of the collection of wastewater samples from ten manholes sediment samples from five manholes and videotaping accessible sewer lines to identify any breaches Four new monitoring wells were installed developed and sampled along with the nine existing on site monitoring wells Additional groundwater level measurements were collected during the CSP sampling event but no additional samples for analytical testing were collected Miscellaneous samples collected throughout the Site during the initial sampling event included twenty refractory brick samples eighteen concrete samples, six mastic samples, two product samples three sediment samples and eleven surface wipe samples

Drilling and sampling activities were performed in accordance with procedures described in the FSP (URS 2002) soil boring advancement and sampling (Section 5 2) monitoring well installation development and sampling (Section 5 3) sewer wastewater and sediment sampling (Section 5 4), concrete sampling (Section 5 5) test pit and trench excavation and sampling (Section 5 6) surface wipe sampling (Section 5 7), video surveying for the sewers (Section 5 8) and refractory brick sampling (Section 5 9) Equipment and personnel decontamination was conducted in accordance with the procedures detailed in the FSP (Section 5 11) including

heptane rinse for reusable sampling equipment Sample labeling handling and documentation was performed in accordance with Section 6 of the FSP

Field conditions presented several challenges to the collection of the concrete mastic and product samples The following procedures describe the modification to the concrete sampling protocol and implementation of mastic and product sampling procedures which were not defined in the FSP

- **Concrete**

  The FSP stated that the concrete sampling procedure would consist of collecting a concrete core in the field and submitting it to the laboratory to be pulverized and analyzed However situations and conditions prevented this so all concrete samples were collected in accordance with the following procedure

  The area from which the sample was to be collected was marked and then cleaned of all loose debris and dust

  a hammer drill was used to create between five and sixteen holes of the appropriate depth (sample intervals were 0 to 1 inch and 2 to 3 inches)

  dust from these holes was collected and placed in labeled sample containers and submitted to the laboratory for analysis

- **Mastic** - Mastic samples were collected by prying floor tiles loose scraping the underlying mastic from the sub floor with a chisel or similar tool then collecting the mastic in a labeled sample container for submittal to the laboratory for analysis

- **Product** - Product samples were collected using a stainless steel scoop or similar tool to obtain liquid product from a container and transfer it to a labeled sample jar for submittal to the laboratory for analysis Samples were identified and collection jars labeled in the field as products

During the initial investigation period Arrowhead Contracting Inc (ACI) provided excavation and concrete coring and cutting equipment and personnel to allow access to soils underneath buildings and roadways Investigation derived waste (IDW) management services (cutting fluid and decontamination water collection soil cuttings drum storage excavation material handling and disposal analysis and permitting) were also provided by ACI During the CSP Concrete Cutting Services Inc provided concrete coring equipment and services and URS personnel performed the IDW management

All sample locations were surveyed by a licensed surveyor (St Charles Engineering and Surveying) except for those that were not accessible inside of buildings or due to Building 3 demolition activities For locations inside of buildings one location close to a doorway was surveyed and the remaining locations were measured from that location with a surveyor s tape

All laboratory analyses for the initial investigation except asbestos and dioxin were performed by TriMatrix Laboratories Inc in Grand Rapids Michigan Asbestos was analyzed by EMSL Analytical Inc (a National Voluntary Laboratory Accreditation Program (NVLAP) certified laboratory) in Ann Arbor Michigan Triangle Laboratories in Durham, North Carolina performed dioxin analysis During the CSP Severn Trent Laboratories Inc (STL) performed all

laboratory analyses in their St Louis Missouri laboratory except for dioxins which were analyzed in their Sacramento California laboratory Quality Assurance (QA) samples for both sampling events were submitted to the USACE Waterways Experiment Station Environmental Laboratory Omaha Branch (CEWES) in Omaha Nebraska for analysis EPA representatives also collected split samples of various media for analysis during both sampling events All analyses were performed in accordance with the Quality Assurance Project Plan (QAPP) Part II of the SAP except as indicated herein **Table 2 2** presents the analysis types and analytical methods used for each group of compounds as well as a legend of analytical acronyms

The following SSEBS investigation area specific discussions of field activities include the media intervals quantities and locations of samples collected general field procedures used and any deviations from the original sampling plan presented in the FSP All activities were conducted during the initial sampling event unless otherwise indicated The CSP was implemented to better define the nature and extent of contamination found during the initial sampling event A summary of the analyses for all samples is presented in **Table 2-3** All of the on site sample locations are shown on **Figure 2-1**

2 1 BUILDING 1

All sampling locations for the Building 1 Investigation Area are shown on **Figure 2-2**

2 1 1 Concrete

One concrete sample location (01CS 01) was planned in Building 1 in an oil spot on the floor near the southwest corner This oil spot was wipe sampled during the Comprehensive EBS investigation and found to contain PCBs Concrete samples were collected at this location from 0 1 inch and from 2 3 inches using a hammer drill and analyzed for PCBs

2 1 2 Soils

Initial Sampling Event

Seventeen Geoprobe® soil borings (01SB 01 through 01SB 17) were planned to assess areas potentially impacted by historic industrial activities in and around Building 1 Eleven of these borings (01SB 01 through 01SB 11) were planned within the footprint of the building and the other six were located in the parking areas (former billet yards) to the east (01SB 12 through 01SB 15) and west (01SB 16 and 01SB 17) of the building Conditions at several boring locations within Building 1 required the following modifications from the FSP

- Boring 01SB 09 was intended to investigate a second sump along the south wall of the building however a second sump was not identified during sample layout activities so this boring was eliminated
- Several boring locations (01SB 08 01SB 10 and 01SB 11) were offset adjacent to sumps instead of in them because these locations were inaccessible for the concrete coring machine and the Geoprobe® could not penetrate the concrete bottom of the sump Samples were still collected at the designated depths relative to the bottom of the sumps

- Boring 01SB 10 was advanced using a stainless steel hand auger due to overhanging structures blocking access for the Geoprobe® However the hand auger met refusal at 5 5 feet after collection of samples 01SB 10(0 0 5) 0802 and 01SB 10(04 05) 0802 therefore the boring was offset and completed using the Geoprobe® These borings were later identified as 01SB 10Shallow and 01SB 10Deep
- Borings 01SB 04 and 01SB 07 were proposed to be located within five feet of each other As a result 01SB 07 was located and sampled as planned (in an oil stained area) and 01SB 04 was relocated within an open sump found in the southwest corner of the building The operational purpose of this sump was not known

Samples from borings 01SB 01 and 01SB 02 were analyzed for PCBs and TPH Samples from borings 01SB 03 01SB 05 01SB 06 and 01SB 12 through 01SB 17 were analyzed for metals Samples from boring 01SB 04 were analyzed for metals PAHs PCBs and volatile organic compounds (VOCs) Samples from borings 01SB 07 were analyzed for PCBs Samples from borings 01SB 08 01SB 10 and 01SB 11 were analyzed for metals PCBs and TPH

Ten risk assessment borings were associated with Building 1 Four of the sample locations (RA 01SB 01 through RA 01SB 04) were situated in the parking area (former billet yard) west of Building 1 two (RA 01SB 05 and RA 01SB 06) were within the footprint of the building and four (RA 01SB 07 through RA 01SB 10) were located in the parking area (former billet yard) east of Building 1 All of the risk assessment borings were sampled using the Geoprobe® rig and analyzed for metals PAHs PCBs and VOCs

Contingency Sampling Program

Three additional soil borings (01SB 10A 01SB 10B and 01SB 10C) were advanced to define the extent of the PCBs detected above the screening level at 01SB 10 Samples were collected from all three borings from 0 to 0 5 feet bgs using the Geoprobe® rig except 01SB 10A which was sampled with a stainless steel hand auger due to overhead obstructions blocking rig access to the location Samples from 01SB 10A 01SB 10B and 01SB 10C were analyzed for PCB 1254 The eastern extent is defined by sample location 01SB 11

One additional boring (01SB 15A co located with sewer soil boring SRSB 39) was sampled to define the extent of arsenic detected above the screening level at 01SB 15 One sample was collected from 0 0 5 ft bgs and analyzed for arsenic Sample locations RA 01SB 08 RA 01SB 09 and RA RRSB 07 define the northern eastern and western boundaries

2 2 BUILDING 2

All sampling locations for the Building 2 Investigation Area are shown on **Figure 2-3**

2 2 1 Asbestos Containing Materials

Twenty refractory brick samples were collected from the debris piles in the forge furnace foundations in Building 2 Two types of refractory bricks were identified and one sample of each type was collected from each foundation for asbestos fiber analysis

2 2 2 Concrete

The FSP did not include concrete sampling in Building 2 however significant oil staining was observed on the floor and therefore ten concrete sampling locations (02CS 01 through 02CS 10) were identified Samples were collected at each of these locations from 0 1 inch using a hammer drill and analyzed for PCBs

2 2 3 Product

Product samples were not addressed in the FSP however an oil filled pipe was identified in the southeast corner of the building A sample (02PD 01) of the oil was collected and submitted for TPH and PCB analyses

Four small tanks with conduits containing a black substance were also observed in the western mezzanine One of these tanks was opened and a product sample (02PD 02) was collected and analyzed for PCBs

2 2 4 Soils

Initial Sampling Event

Nine soil borings (02SB 01 through 02SB 09) were planned within the footprint of Building 2 in areas that may have been impacted by historic industrial activities Borings 02SB 01 and 02SB 02 were located in oil stained areas in the northeast corner of the building Two other borings were located in oil stained areas of the pump stations in Building 2 (02SB 03 in the west and 02SB 04 in the east pump station) Borings 02SB 05 through 02SB 09 were located at the bottom of the central pipe trench connecting the pump stations All of these borings were advanced using the Geoprobe® rig and analyzed for PCBs (and dioxins if PCBs were detected) Samples from borings 02SB 01 through 02SB 04 were also analyzed for TPH

Eight test pit soil borings were planned in two test pits located in production loops along either side of the building 02TS 01 through 02TS 04 in the western test pit and 02TS 05 through 02TS 08 in the eastern test pit Two samples (0 to 0 5 feet and 4 to 5 feet bgs) were collected from each boring using a stainless steel hand auger and analyzed for metals PAHs PCBs (dioxins if PCBs were detected) and VOCs

Two modifications were made to the FSP for the Test Pit soil samples in Building 2 First boring 02TS 01 was originally located beneath the western test pit floor however the concrete floor of the trench at this location was more than six feet thick As a result the boring was re located adjacent to the trench and three samples were collected using the Geoprobe® rig These samples were noted as 8 to 9 feet 12 to 13 feet and 17 to 18 feet bgs as measured from the floor of the building to coincide with the prescribed depths from the bottom of the 8 foot deep pit Second a discretionary sample was collected in boring 02TS 05 from 2 to 3 feet bgs and analyzed as the other test pit soil samples In addition to the eight test pit soil borings identified in the FSP a ninth test pit boring location (02TS 09) was located in a third test pit that was excavated south of the eastern pit in Building 2 Two additional soil samples were collected and analyzed for metals PAHs PCBs (dioxins if PCBs were detected) and VOCs Dioxin analysis of test pit soil samples containing PCBs was not specified in the FSP but was added for consistency within Building 2 soil samples

Twelve risk assessment borings (RA 02SB 01 through RA 02SB 12) were advanced within the footprint of Building 2 All borings were sampled using a Geoprobe® rig with the exception of RA 02SB 09 which was collected from below the bottom of a trench using a stainless steel hand auger Two other risk assessment borings (RA 02SB 03 and RA 02SB 12) required modification to the FSP when they were offset from the trenches they were originally located within and samples were collected using the Geoprobe® rig Three samples were collected from each boring and analyzed for metals PAHs PCBs dioxins (if PCBs were detected) and VOCs

ACI collected composite soil samples from the material removed from the test pit excavations for waste characterization Backfilling of the test pit excavations was postponed until completion of the Building 2 Siding and Structural Steel Screening Study

Contingency Sampling Program

Due to the detection of dioxins and PCBs in Building 2 ten additional soil borings were advanced around the perimeter of the building using the Geoprobe® rig to evaluate the extent of these contaminants These sample locations (02SB 10 through 02SB 19) were sampled at three depths (0 0 5 4 5 and 9 10 ft bgs) and were analyzed for PCBs and dioxins

2 2 5 Surface Wipes

Surface wipe samples were not planned in the FSP for Building 2 However during excavation activities in one of the trenches (near the center of the building) some conduit was encountered that was filled with a black viscous substance A wipe sample (02SW 01) was collected from the wiring that was covered with this black substance and analyzed for PCBs

2 3 BUILDING 3

2 3 1 Soils

Building 3 was investigated by ACI under Contract No DACW41 00 D0019 Task Order No 002 Contaminated soils were sampled and subsequently removed along with the building structure during 2002 The foundation excavation was backfilled in the spring of 2003 These actions have addressed and resolved the issues cited in the NON previously identified in **Section 1 3 4** Results from the April 2002 sampling event in Building 3 were used to define impacted soils for removal Since Arrowhead collected post removal clearance samples the results of the previous sampling will not be addressed in the SSEBS and HHBRA as these materials have been removed from the Site

2 4 BUILDING 4

All sampling locations for the Building 4 Investigation Area are shown on **Figure 2-4**

2 4 1 Concrete

One concrete sample location (04CS 01) was planned in Building 4 in an oil spot on the concrete floor identified in the Comprehensive EBS as containing PCBs Concrete samples were collected from this location from 0 1 inch and from 2 3 inches using a hammer drill

During sample layout activities an oily residue was observed in the bottom of the utility trenches that were located to the north of the air compressor pits Two additional concrete samples (04CS 02 and 04CS 03) were located in these trenches and analyzed for PCBs These concrete samples were collected from 0 1 inch only using a hammer drill

2 4 2 Soils

Initial Sampling Event

There were three soil borings (04SB 01 through 04SB 03) advanced to assess potentially impacted soils due to industrial activities in Building 4 Boring 04SB 01 was located underneath a transformer in an area of PCB contaminated oil staining Samples were collected from three depths (0 to 0 5 feet 4 to 5 feet and 6 to 7 feet bgs) using a stainless steel hand auger prior to encountering refusal and analyzed for PCBs Borings 04SB 02 and 04SB 03 were collected from beneath two randomly selected concrete equipment pits inside Building 4 Samples were collected from three depths (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) using a stainless steel hand auger and analyzed for PCBs and TPH Two additional borings (RA 04SB 01 and RA 04SB 06) will also be used to assess potentially impacted soils to the west of Building 4 As discussed below these borings were originally intended to be risk assessment borings and were analyzed for metals PAHs PCBs pesticides and VOCs

Ten risk assessment borings (RA 04SB 01 through RA 04SB 10) were planned for Building 4 Eight were originally located within the footprint of the building and two (RA 04SB 01 and RA 04SB 06) were located outside of the building just west of the concrete platform located on the west side of the building The two borings located outside the footprint of the building were changed to be site characterization samples to maintain the consistency of all risk assessment samples for Building 4 being within the building foundation Therefore two additional risk assessment borings (RA 04SB 01A and RA 04SB 06A) were added within the footprint of the building to replace the two outside borings that would no longer be used for the risk assessment Two samples (0 to 0 5 feet and 2 to 3 feet bgs) were collected from borings RA 04SB 01A RA 04SB 02 RA 04SB 06A and RA 04SB07 The remaining borings were to have three samples (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) collected however all but one (RA 04SB 03) either met refusal or were located in unstable sand fill which began collapsing the boring prior to reaching full depth Borings RA 04SB 04 and RA 04SB 05 each had three samples with the lowest interval at 6 to 6 5 feet bgs Borings RA 04SB 08 and RA 04SB 10 were stopped with the collection of the 4 to 5 foot bgs sample and RA 04SB 09 had only the 0 to 0 5 foot bgs sample collected All risk assessment samples were collected using a stainless steel hand auger and analyzed for metals PAHs PCBs pesticides and VOCs except for sample RA 04SB 02(0 0 5) 0902 for which the pesticide analysis was inadvertently omitted

Contingency Sampling Program

Four additional soil borings were advanced in and around Building 4 during the contingency sampling event Two of these (04SB 04 and 04SB 05) were located in trenches in the vicinities of concrete samples 04CS 02 and 04CS 03 which had detected concentrations of PCBs above the screening level Samples were collected from 04SB 05 with a stainless steel hand auger at depths of 0 to 0 5 and 2 to 3 feet below the concrete bottom of the trench Due to the thickness of concrete in these trenches (greater than 4 feet) boring 04SB 04 was relocated outside the building and sampled at depths of 0 to 0 5 4 to 5 9 to 10 and 11 to 12 feet bgs using the Geoprobe® rig Sampling at these depths ensured that appropriate depth below the trench was achieved All six samples from these two borings were analyzed for PCBs The remaining two borings (RA 04SB 06B and RA 04SB 08A) were located outside of the building foundation as offsets for samples collected during the initial sampling event which had concentrations of the following PAH compounds above the screening levels benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g h i)perylene indeno(1 2 3 cd)pyrene and phenanthrene in boring RA 04SB 06B and benzo(b)fluoranthene in boring RA 04SB 08A One sample was collected from RA 04SB 06B off the west edge of the roadway west of Building 4 from 0 to 0 5 feet bgs using the Geoprobe® rig This sample was analyzed for benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g h i)perylene indeno(1 2 3 cd)pyrene and phenanthrene (PAHs) Boring RA 04SB 08A was located south of Building 4 with one sample collected from 4 to 5 feet bgs and analyzed for benzo(b)fluoranthene (PAH)

2 4 3 Surface Wipes

Two surface wipe samples (04SW 01 and 04SW 02) were collected from transformer pads in the basement of this building Both samples were analyzed for PCBs

During sample layout activities an oily residue was observed in the bottom of the utility trenches that were located to the north of the air compressor pits As a result two additional surface wipe samples (04SW 03 and 04SW 04) were collected in these trenches and analyzed for PCBs These surface wipe samples were co located with concrete samples 04CS 02 and 04CS 03 respectively

2 5 BUILDING 5

All sampling locations for the Building 5 Investigation Area are shown on **Figure 2-5**

2 5 1 Mastic

Three mastic samples were collected from Building 5 and analyzed for PCBs The first sample (05MC 01) was collected on the first floor outside the elevator doorway The second sample (05MC 02) was collected from beneath the floor tile inside a former maintenance room on the first floor The third sample (05MC 03) was collected from mastic remaining on top of the wood flooring in the southern portion of the catwalk that connected Buildings 3 and 5 This catwalk has since been removed as a part of the Building 3 demolition

2 5 2 Soils

Initial Sampling Event

One Geoprobe® soil boring (05SB 01) was located in the former oil storage area at the southwest corner of Building 5 Three samples (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) were collected from this boring for PAH and TPH analyses

There were sixteen risk assessment borings (RA 05SB 01 through RA 05SB 16) advanced using a stainless steel hand auger within the basement of Building 5 Two samples were collected from each location (0 to 0 5 feet and 2 to 3 feet bgs) and analyzed for explosives metals PAHs PCBs pesticides and VOCs

Contingency Sampling Program

The nature and extent of contamination was sufficiently defined by the samples collected during the initial sampling event therefore no additional sampling was performed during the Contingency Sampling Event

2 5 3 Surface Wipes

One surface wipe sample (05SW 01) was collected from an oil stained area in the southeastern corner of the elevator shaft This sample was analyzed for PCBs

2 6 BUILDING 6

All sampling locations for the Building 6 Investigation Area are shown on **Figure 2-6**

2 6 1 Mastic

Three mastic samples were collected from Building 6 and analyzed for PCBs The first sample (06MC 01) was collected from exposed mastic located in the locker room in the second floor catwalk that connected Buildings 3 and 6 This catwalk has since been removed as a part of the Building 3 demolition The second sample (06MC 02) was collected from beneath floor tile in the hallway just south of the catwalk that connected Buildings 3 and 6 The third sample (06MC 03) was collected on the first floor near the western door on the north side of the building

2 6 2 Sediment

One sediment sample (06SD 01) was collected from the heating duct found in the hearth room on the first floor of Building 6 This sediment sample was analyzed for metals SVOCs and VOCs

2 6 3 Soils

Initial Sampling Event

One Geoprobe® soil boring (06SB 01) was located in the former oil storage area at the southeast corner of Building 6 Three samples (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) were collected from this boring for PAH and TPH analyses

There were fourteen risk assessment borings (RA 06SB 01 through RA 06SB 07 and RA 06SB 09 through RA 06SB 15) advanced using a stainless steel hand auger within the basement of Building 5 Two other locations (RA 06SB 08 and RA 06SB 16) were not sampled because a wall divided the basement and access to the other area could not be found Two samples were collected from each location (0 to 0 5 feet and 2 to 3 feet bgs) and analyzed for explosives metals PAHs PCBs pesticides and VOCs

Contingency Sampling Program

Several soil samples in the basement of Building 6 had detections of beryllium mercury and 4 4 dichlorodiphenyltrichloroethene (4 4 DDT) (a pesticide) above the screening levels While most of these detections were in surface samples surrounded by other samples that were not above the screening level one sample (RA 06SB 04) was from the 2 3 ft bgs depth and therefore this zone was not vertically defined One additional boring (RA 06SB 04A) was advanced during the contingency sampling event using a stainless steel hand auger This boring was sampled from 4 to 5 feet bgs and analyzed for mercury and a pesticide 4 4 DDT

2 6 4 Surface Wipes

Five surface wipe samples were collected from this building One (06SW 01) was co located with 06SD 01 and collected from inside the heating duct that was found in the hearth room on the first floor of Building 6 This wipe sample was analyzed for VOCs SVOCs and metals The other four wipe samples were collected from the underground concrete walkways that connected Buildings 3 and 6 (06SW 02 through 06SW 04) and Building 6 to the SLOP building to the south (06SW 05) These four samples were analyzed for PCBs

2 7 BUILDING 7

All sampling locations for the Building 7 Investigation Area are shown on **Figure 2-7**

2 7 1 Concrete

One concrete sample (07CS 01) was collected from an oil stained area on the concrete floor of Building 7 using a hammer drill This concrete sample was analyzed for TPH

2 7 2 Sediment

A test pit was excavated within the bounds of the cooling tower foundation – just east of Building 7 A sediment sample (07TD 01) was planned from this pit to characterize the cooling

tower blowdown if present There was no layer of sediment encountered in this test pit therefore no sediment sample was collected

2 7 3 Soils

Initial Sampling Event

One boring (07SB 01) was co located with 07CS 01 in an area of oil stained concrete floor inside Building 7 Three samples were collected from the soil beneath this location using a stainless steel hand auger and analyzed for TPH

Sixteen risk assessment soil borings (RA 07SB 01 through RA 07SB 16) were planned in the area in and around Building 7 Two of the borings (RA 07SB 05 and RA 07SB 09) were located inside the footprint of Building 7 and had to be advanced and sampled at two depths (0 to 0 5 feet and 2 to 3 feet bgs) using stainless steel hand augers The remaining locations were sampled at three depths (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) using the Geoprobe® except for RA 07SB 10 which met refusal at 2 feet bgs therefore only one sample was collected All samples collected were analyzed for metals PAHs PCBs and VOCs

ACI collected composite soil samples from the material removed from the test pit excavations for waste characterization Backfilling of the test pit excavations was postponed until completion of the Building 2 Siding and Structural Steel Screening Study

Contingency Sampling Program

PCBs were detected at concentrations above the screening level at one location (RA 07SB 02) in the surface sample adjacent to Building 7 Samples below the screening level were located east south and west of this sample so only the north extent required further characterization One additional boring (RA 07SB 02A) was advanced and sampled from 0 to 0 5 feet bgs during the contingency sampling event using the Geoprobe® rig This sample was analyzed for PCB 1254

2 8 BUILDING 8

All sampling locations for the Building 8 Investigation Area are shown on **Figure 2-8**

2 8 1 Sediment

Two sediment samples were collected from the utility trench that previously contained fuel oil lines One (08SD 01) was located north of the main doorway on the north side of Building 2 in the trench from the original location of the tanks and pump building north of Building 2 The other (08SD 02) was located just north of the northeast corner of Building 2 in the trench from the second location of the tanks and pump building east of Building 2 Both samples were collected from the bottom of the trench using stainless steel hand trowels Neither location contained a significant amount of sediment Both samples were analyzed for TPH

2 8 2 Soils

Initial Sampling Event

Seven soil borings (08SB 01 through 08SB 07) were advanced along the path of the former pipeline trench that connected the post 1958 fuel oil storage area pump house to Building 2 Excavation along the path revealed that the concrete trench had been removed prior to this investigation Three samples were collected from each boring using the Geoprobe® rig and analyzed for TPH One additional boring (08SB MW02) was advanced adjacent to monitoring well 08MW 02 because impacted soil was observed at this location during well installation A soil sample was collected from this boring in the impacted depth (11 to 13 feet bgs) and analyzed for TPH

There were twenty risk assessment borings (RA 08SB 01 through RA 08SB 20) advanced within the former oil storage area using the Geoprobe® rig Three samples were collected from each location (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) and analyzed for metals, PAHs PCBs and VOCs One discretionary sample was collected from boring RA 08SB 15 at 14 to 15 feet bgs due to noticeable petroleum odors from below the 9 to 10 foot sample This sample will not be used for the HHBRA due to the depth of collection but will be used in characterizing the Site Due to the odors present in the soil this sample was analyzed for TPH in addition to the analyses listed above

ACI collected composite soil samples from the material removed from the test pit excavations for waste characterization Backfilling of the test pit excavations was postponed until completion of the Building 2 Siding and Structural Steel Screening Study

Contingency Sampling Program

Total petroleum hydrocarbons – diesel range organics (TPH DRO) was detected above the screening level at location 08SB 07 in the 7 8 ft bgs sample With 08SB 06 defining the northern extent and RA 08SB 09 defining the western extent two additional borings (08SB 07A and 08SB 07B) were advanced south and east of 08SB 07 using the Geoprobe® rig with samples collected in the 7 8 ft bgs depth interval and analyzed for TPH DRO

1 1 Dichloroethene (1 1 DCE) was detected above the screening level near Building 8 at RA 08SB 05 in the surface (0 to 0 5 ft bgs) sample Since RA 08SB 01 RA 08SB 06 and RA 08SB 09 define the northern eastern and southern extents respectively one additional boring (RA 08SB 05A) was advanced west of RA 08SB 05 and the sample collected from 0 to 0 5 ft bgs was analyzed for 1 1 DCE

PAHs specifically acenaphthylene benzo(a)anthracene benzo(a)pyrene benzo(g,h i)perylene and phenanthrene were detected above the screening level at location RA 08SB 16 in the 4 5 ft bgs sample RA 08SB 12 RA 08SB 15, and RA 08SB 20 define this location to the north west and south respectively The eastern extent was defined by advancing an additional boring RA 08SB 16A and collecting a 4 5 ft bgs sample for analysis of the indicated PAHs

2 9 BUILDING 10

All sampling locations for the Building 10 Investigation Area are shown on **Figure 2-9**

2 9 1 Soils

Initial Sampling Event

Five soil borings (10SB 01 through 10SB 05) were advanced in the vicinity of Building 10 the former underground quench oil storage tank area Boring 10SB 01 was located within the area of the UST removal Borings 10SB 02 through 10SB 05 were located outside of the excavated UST removal area to determine if all of the impacted soil had been removed Two borings 10SB 01 and 10SB 03 encountered refusal prior to achieving the required depth for sampling therefore these borings had to be offset with boring locations 10SB 01A and 10SB 03A respectively A discretionary sample was collected from boring 10SB 01 from a thin layer (approximately 4 inches thick) of impacted soil immediately above the refusal point at 15 feet bgs All samples were collected using the Geoprobe® and analyzed for benzene toluene ethylbenzene and xylenes (BTEX) and TPH

There were no risk assessment sample locations in this investigation area

Contingency Sampling Program

All Building 10 samples specified in the FSP were collected and the results were all below the screening level for TPH DRO However samples taken from deeper than 10 ft bgs in nearby sewer borings (SRSB 18 and SRSB 19) had detections above the screening level in the 14 15 ft bgs depth interval Therefore four additional soil borings (10SB 06 through 10SB 09) were advanced using the Geoprobe® rig during the contingency sampling event These borings were located in the approximate vicinities of soil borings 10SB 02 through 10SB 05 from the first sampling event Samples were collected from 14 to15 feet bgs in each boring and analyzed for TPH DRO

2 10 NORTHEAST PARKING AREA

All sampling locations for the Northeast Parking Area Investigation Area are shown on **Figure 2-10**

2 10 1 Soils

Initial Sampling Event

Eight Geoprobe® risk assessment borings (RA NESB 01 through RA NESB 08) were advanced in the Northeast Parking Area Three samples (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) were collected from each location and analyzed for metals PAHs PCBs and VOCs

Contingency Sampling Program

PAHs were detected above the screening level in the 0 0 5 ft bgs sample at location RA NESB 01 Adjacent samples defined all but the eastern extent therefore one additional soil boring (RA NESB 01A) was advanced using the Geoprobe® rig during the contingency sampling event A sample was collected from 0 to 0 5 feet bgs and analyzed for

benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g h i)perylene indeno(1 2 3 cd)pyrene and phenanthrene (all PAHs)

2 11 RAILROADS

All sampling locations for the Railroad Investigation Area are shown on **Figure 2-11**

2 11 1 Soils

Initial Sampling Event

Eleven risk assessment soil borings (RA RRSB 01 through RA RRSB 11) were advanced at 150 foot intervals along the railroad lines on the Site using the Geoprobe® rig Two other borings (RA RRSB 12 and RA RRSB 13) were planned along the railroad line leaving the Site to the south but access to the adjacent property could not be obtained Three samples (0 to 0 5 feet 4 to 5 feet and 9 to 10 feet bgs) were collected from each location and analyzed for metals PAHs PCBs and VOCs

Contingency Sampling Program

Sample RA RRSB 10(0 0 5) 0802 exhibited 1 1 DCE above the screening level in the 0 to 0 5 foot bgs interval This was the only detection along the railroads above the screening level for 1 1 DCE Since this location is relatively remote from other borings four additional soil borings (RA RRSB 10A RA RRSB 10B RA RRSB 10C and RA RRSB 10D) were advanced with the Geoprobe® rig during the second sampling event Samples were collected from each boring from 0 to 0 5 feet bgs and analyzed for 1 1 DCE (a VOC)

2 12 ROADWAYS

All sampling locations for the Roadway Investigation Area are shown on **Figure 2-12**

2 12 1 Soils

Initial Sampling Event

Sixteen pairs of roadway risk assessment borings (RA RDSB 01 through RA RDSB 16 and RA RDSB 01E through RA RDSB 16E) were advanced at 150 foot intervals along the site roadways The borings without an E designation were collected from along the center of the roadway and the borings with an E designation were collected from the edge of the roadway where runoff was expected All of these borings were completed using the Geoprobe® rig and samples were analyzed for metals PAHs PCBs and VOCs (four samples located around former Building 9 (RA RDSB 13 RA RDSB 13E RA RDSB 14 and RA RDSB 14E) were also analyzed for explosives)

Contingency Sampling Program

1 1 DCE (a VOC) was detected above the screening level at RA RDSB 01E in the 9 10 ft bgs sample Since RA RDSB 01 defines the southern extent and the property boundary with a retaining wall and drop off to I 70 defines the northern extent two additional borings (RA RDSB 01EA and RA RDSB 01EB) were advanced using the Geoprobe® rig and analyzed for 1 1 DCE in the 9 10 ft bgs sample interval

PAHs specifically benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g h i)perylene and phenanthrene were detected above the screening levels at RA RDSB 02 in the 9 10 ft bgs sample Since RA RDSB 02E and the property boundary define the northern and eastern extents two additional borings RA RDSB 02A to the south and RA RDSB 02B to the west were advanced using the Geoprobe® rig with samples collected and analyzed for these PAHs in the 9 10 ft bgs depth interval

Antimony was detected above the screening level in the 0 to 0 5 ft bgs sample at RA RDSB 16E With RA RDSB 16 defining one direction three additional borings (RA RDSB 16EA RA RDSB 16EB and RA RDSB 16EC) were advanced using the Geoprobe® rig with 0 to 0 5 ft bgs samples collected and analyzed for antimony

2 13 SEWERS

All sampling locations for the Sewer System Investigation Area are shown on **Figure 2-13**

2 13 1 Survey

After a preliminary survey of manhole locations and collection of wastewater and sediment samples from the sewer system the main sewer lines at SLAAP were surveyed with a video camera These lines were videotaped to identify any breaches in the lines that may have historically been conduits for releasing contaminants to the subsurface The survey consisted of the following

- 177 linear feet of 6 inch diameter sewer line
- 2 667 linear feet of 12 inch diameter sewer line
- 719 linear feet of 15 inch diameter sewer line and
- 250 linear feet of 18 inch diameter sewer line

ODESCO Industrial Services Inc (ODESCO) completed the sewer survey in accordance with the FSP with the following exceptions After assessing the conditions at the site ODESCO personnel advised that a regular survey camera used in conjunction with ventilation equipment would adequately safeguard against the development of any explosive atmospheres within the sewer system therefore an explosion proof camera was not used Several sections of sewer line were removed or blocked either intentionally with brick and mortar or with hardened sediments and debris **Figure 2 1** represents the sewer system as it currently exists and also delineates portions of the system that were inaccessible and not surveyed

2 13 2 Sediment

Initial Sampling Event

Thirteen sediment samples were identified in the FSP to be collected from the combined (storm/sanitary) sewer system at SLAAP Eleven of these samples were to be site wide sediment samples (SRSD 01 through SRSD 11) and two (02SD 01 and 02SD 02) were to be associated with the investigation of Building 2 because available drawings depicted these two manholes inside the building During site reconnaissance and sample layout activities it was observed that the two manholes were actually located immediately south of Building 2 Therefore these locations are treated as site wide sediment samples although the sample nomenclature remained the same

Sediment was present in only five of the intended thirteen sample locations therefore the only sediment samples collected were SRSD 02 SRSD 03 SRSD 04 02SD 01 and 02SD 02 These samples were analyzed for metals PCBs, SVOCs TPH and VOCs (except 02SD 01 and 02SD 02 were not analyzed for SVOCs since they were originally designated as Building 2 characterization samples)

Contingency Sampling Program

Due to the extent of dioxin contamination found in Building 2 during the initial sampling event further characterization of the sewer system in this portion of the Site was required SRSD 03 was identified for PCB and dioxin analyses to address this data gap However, this manhole was clogged with debris and soil runoff from the Building 3 demolition and backfill activities Therefore the sample was relocated and collected from SRSD 02 and analyzed for PCBs and dioxins

2 13 3 Soils

Initial Sampling Event

Thirty four sewer soil borings (SRSB 01 through SRSB 34) were located adjacent to the sewer lines approximately every 150 feet based on the sewer line survey Samples were collected using a Geoprobe® rig and analyzed for metals PCBs SVOCs TPH and VOCs Starting at the elevation of the sewer line the FSP indicated that three soil samples were to be collected per boring at depths of 0 to 0 5 feet 4 to 5 feet and 9 to 10 feet below the sewer line Since all of these samples would be of subsurface soils and the RS60 sampler would be difficult to advance to depth the first sample interval was increased to one foot to ensure sufficient sample volume from the Macrocore 2 sampler Due to the depth of the sewers on site sixteen of the borings met refusal at the soil bedrock interface prior to attaining sufficient depth for the nine to ten foot sample For four of these borings the third sample was collected in the final of foot of soil prior to refusal Nine of these borings met refusal between five and six feet below the sewer line therefore in these instances only two samples were collected Two borings met refusal between three and four feet below the sewer line therefore the second sample was collected in the final foot of soil prior to refusal Refusal was met in one boring less than one foot below the first

sample interval therefore no additional samples were collected The following summarizes the samples collected from each sewer soil boring

Samples Collected from Sewer Soil Borings

3 Samples (0 1 4 5 9 10)	3 Samples (0-1 4 5 <9)	2 Samples (0-1 4 5)	2 Samples (0 1 <4)	One Sample (0 1)
SRSB 05	SRSB 09	SRSB 01	SRSB 10	SRSB 18
SRSB 06	SRSB 12	SRSB 02	SRSB 20	
SRSB 07	SRSB 27	SRSB 03		
SRSB 08	SRSB 27	SRSB 04		
SRSB 15		SRSB 11		
SRSB 16		SRSB 13		
SRSB-19		SRSB 14		
SRSB-21		SRSB 17		
SRSB-22		SRSB 28		
SRSB-23				
SRSB 24				
SRSB 25				
SRSB 26				
SRSB 29				
SRSB-30				
SRSB 31		second sample		
SRSB 32		was collected		
SRSB 33		from 5 to 6 feet		

Contingency Sampling Program

Sixteen additional soil borings were advanced using the Geoprobe® rig during the CSP Ten of these soil borings (SRSB 35 through SRSB 44) were intended to assess the potential for contamination of the soil in the immediate vicinity of breaches in the sewer lines identified during the sewer survey and therefore were analyzed for metals PCBs SVOCs TPH and VOCs Due to the depth of the sewers on the Site six of the borings met refusal at the soil bedrock interface prior to attaining sufficient depth for the nine to ten foot sample For one of these borings the third sample was collected in the final foot of soil prior to refusal Two of these borings met refusal between five and six feet below the sewer line in these instances only two samples were collected Refusal was met in two borings less than one foot below the first sample interval therefore no additional samples were collected One boring encountered refusal at a depth well above that indicated for the sewer line A suitable location for an offset boring could not be located due to construction and proximity requirements to the identified breach therefore no samples were collected from boring SRSB 43 The following summarizes the samples collected from each sewer soil boring

Samples Collected from Sewer Soil Borings

3 Samples (0 1 4 5 9 10)	3 Samples (0 1 4 5 <9)	2 Samples (0-1 4 5)	One Sample (0 1)	No Samples Collected
SRSB 37	SRSB 36	SRSB 35	SRSB 42	SRSB 43
SRSB 38		SRSB-41	SRSB 44	
SRSB 39				
SRSB 40				

Four of the remaining soil borings (SRSB 16A, SRSB 16B SRSB 16C and SRSB 16D) were advanced to define the extents of a TPH DRO detection above the screening level at location SRSB 16 Due to the highly variable surface elevation in the vicinity of these samples the sample depths were adjusted to be at the same elevation as the original sample The resulting sample depths were 5 5 to 6 5 feet bgs for SRSB 16A 8 to 9 feet bgs for SRSB 16C and 9 to 10 feet bgs for both SRSB 16B and SRSB 16D These four samples were analyzed for TPH DRO

The other two additional borings (SRSB 30A and SRSB 30B) were advanced in the vicinity of SRSB 30 to define the extent of PAHs found at concentrations above the screening level in the 3 to 4 ft bgs sample These new borings were sampled from 3 to 4 feet bgs and analyzed for benzo(a)anthracene benzo(a)pyrene, benzo(b)fluoranthene benzo(g,h,i)perylene dibenz(a h)anthracene indeno(1 2 3 cd)pyrene and phenanthrene (all PAHs)

2 13 4 Wastewater

Thirteen wastewater samples were identified in the FSP to be collected from the combined (storm/sanitary) sewer system at SLAAP Eleven of these samples were to be site wide wastewater samples (SRWW 01 through SRWW 11) and two (02WW 01 and 02WW 02) were to be associated with the investigation of Building 2 because available drawings showed these two manholes inside the building During site reconnaissance and sample layout activities it was observed that the two manholes were actually located immediately south of Building 2 Therefore these locations are treated as site wide wastewater samples although the sample nomenclature remained the same

Wastewater was present in all but three of the intended thirteen sample locations therefore wastewater samples SRWW 05 SRWW 08 and SRWW 09 were not collected The collected samples were analyzed for metals PCBs SVOCs TPH and VOCs (02WW 01 and 02WW 02 were not analyzed for SVOCs since they were originally designated as Building 2 characterization samples)

2 14 GROUNDWATER

All sampling locations for the Groundwater Investigation Area are shown on **Figure 2-14**

Four new groundwater monitoring wells were installed by Aquadrill Inc with a cable tool equipped drill rig in the overburden materials on the site Three of these wells (08MW 01 08MW 02 and 08MW 03) were associated with Building 8 and one well (03MW 01) was associated with Building 3 The bottom of each of these wells was placed on top of the shale

bedrock These wells were installed in accordance with the FSP with the following exceptions Three of the four monitoring wells were installed with ten foot long screens instead of the five foot long screens specified in the FSP because no obvious water bearing unit was encountered during drilling and the longer screened wells would be more likely to produce water from the clay formation The fourth well (03MW 01) was not deep enough to accommodate a ten foot screen therefore a seven foot screen was installed The other change in well installation procedures was that bentonite chips were used to seal the boreholes instead of the cement bentonite grout specified in the FSP The State of Missouri approved this change since their regulations allow this procedure

Although distinct water bearing formations were not observed during the drilling sufficient water was eventually produced from the silty clay formations in all four of the new monitoring wells Water was observed leaking from an on site fire hydrant in close proximity to several of the new monitoring well installation locations where water was also noted in the gravel layer beneath the roadways

The four new monitoring wells were developed using both a Grundfos pump and disposable bailers The wells were surged in some cases with de ionized water added to the well for sufficient volume and purged dry Since these four wells did not recharge quickly they were not purged again prior to sampling the following week The EPA and MDNR Project Managers approved this change to the FSP because the water level in these wells never stabilized during development

Nine existing on site wells (02MW 01 10MW 01 and SWMW 01 through SWMW 07) are also present on site and were sampled as part of the August/September 2002 field activities Sampling at each of these wells was attempted using low flow techniques with a Fultz pump However every well displayed excessive drawdown during pumping even at rates less than the 0 5 liters (L)/minute required for low flow sampling Therefore each well was pumped dry and allowed to recover for 24 hours before sampling with disposable hand bailers This method can lead to higher turbidity in the samples which may identify contamination in the sample due to soil particles in the unfiltered water sample

Water levels were measured from all thirteen wells at various times throughout the initial sampling event and on two occasions during the CSP

Groundwater samples were collected from all thirteen wells and analyzed for explosives metals nitrates PAHs PCBs pesticides phosphorus SVOCs and VOCs After observing leakage from a fire hydrant near the southeast corner of Building 2 additional analyses were performed to identify the potential city water infiltration into the subsurface soils Field test strips were added to estimate total alkalinity total hardness free chlorine and total chlorine at all thirteen wells and the fire hydrant Also samples from 03MW 01 08MW 03 and 08MW 02 and the fire hydrant were analyzed for chloride and fluoride to compare the city water to the water found in these wells near the observed leaking hydrant

2 15 REGIONAL BACKGROUND

2 15 1 Soils

Ten surface soil samples were collected from local municipal parks The sample results were used to calculate regional background levels of metals and PAHs Five of these samples were collected from Penrose Park located just south of I 70 on both sides of North Kingshighway Boulevard approximately 1 3 miles southeast of SLAAP According to St Louis City Parks Commissioner Mr Dan Skillman Penrose Park has been owned and operated as a park by the City since 1910 He did not know of any previous industrial activity at this location He did mention that an underground diesel fuel storage tank had been located near a maintenance shed in the park however none of the five samples were located near the maintenance shed

The other five samples were collected from Dwight Davis Park located north of I 70 and east of Riverview Boulevard between Lillian and Theodore Avenues approximately 0 4 miles east northeast of SLAAP According to Mr Skillman this park has been owned and operated by the City since 1951 Since it was possible that industrial facilities could have been present on this property prior to 1951 a 1931 Sanborn map of the park area was reviewed The entire area of the park was either residences or open lots in 1931 A gas station with three aboveground storage tanks was indicated on the Sanborn map just north of the park at the southeast corner of Riverview Boulevard and Theodore Avenue This gas station was not within the park boundaries and no samples were collected from this area

The locations of these parks in relation to the Site are shown in **Figure 2-15**

3 1 TOPOGRAPHY

SLAAP is located in the southern portion of the Dissected Till Plains Section of the Central Lowland Province The topography of this area consists of rolling uplands with slopes of 2 to 5 percent and an elevation range of 500 to 550 feet above mean sea level (msl) sloping gently to the south within a 2 mile radius of the SLAAP property (Environmental Data Resources Inc (EDR) 1999) The SLAAP property is bounded on the north by Interstate 70 on the west by Goodfellow Boulevard on the south by PURO (located in a portion of the former SLOP site) (PURO has since been replaced by Triad Manufacturing Inc) and on the east by Riverview Boulevard

3 2 GEOLOGY

The geology of the SLAAP property based on the Comprehensive EBS Report (TTEMI 2000) and initial and CSP field investigations for the SSEBS generally consists of fill materials lean clay (silty clay) fat clay and cherty gravel overlying Pennsylvanian age shale Underlying the shale is the Mississippian age St Genevieve limestone **Figure 3 1** presents a geological cross section location map for the geological cross sections presented in **Figures 3 2** and **3-3**

Fill material consisting of a thin layer of gravel (typically one foot thick) is usually present underneath asphalt and concrete In addition fill material consisting of lean clay is encountered throughout the site generally ranging in thickness from 1 to 8 feet However since the fill material was likely cut from adjacent lean clay portions of the Site the interface is not clear and the true depth of the fill may be significantly deeper in some portions of the Site than described on the boring logs Underlying the fill material is lean clay and in most of the borings fat clay is underlying the lean clay The thickness of the fill/lean clay/fat clay overburden materials overlying the shale range from approximately 14 to 26 feet

Shale was encountered in ten of the thirteen monitoring well borings and twelve soil borings completed during the Comprehensive EBS and SSEBS investigations at depths ranging from 12 to 31 9 feet bgs The maximum thickness of shale encountered was 15 feet however all of these borings were terminated prior to reaching the bottom of the shale unit According to the Comprehensive EBS, a soil boring drilled in 1971 at SLAAP encountered a medium hard medium to fine grained limestone (St Genevieve limestone) at 65 feet and the bedrock units beneath the site were reported as flat lying (TTEMI 2000)

3 3 HYDROGEOLOGY

Bedrock units in and around St Louis are capable of yielding varying amounts of groundwater Well yield depends on site specific geologic and well characteristics Most wells in the St Louis area yield a maximum of 50 gallons per minute from depths down to 800 feet bgs (USATHMA 1979) These wells are screened in limestones and sandstones ranging in age from Mississippian to Ordovician Water yields of up to 1 955 gallons per minute (gpm) can be expected from wells drilled in thick alluvial deposits that contain little silt or clay like material However, no potable water wells are reported to exist within 3 miles down gradient of SLAAP (USAEHA 1993)

Regional groundwater flow in the SLAAP area is north northeast toward the Mississippi River The stormwater runoff in St Louis County discharges to the Missouri River to the north the Mississippi River to the east and the Meramec River to the south

3 4 CLIMATOLOGY/METEOROLOGY

Average annual precipitation is about 36 inches with the wettest period (about 10 5 inches) between March and May in the form of showers and thunderstorms Snowfall averages 18 inches annually January is the coldest month with an average low temperature of 20°F July is the warmest month with an average high temperature of 89°F (NOAA 2002)

3 5 HYDROLOGY

No surface water is present on the SLAAP property The closest body of water the Mississippi River is located about 3 miles from the property Stormwater on the property is collected by catch basins that discharge to the Metropolitan St Louis Sewer District combined sewer system

3 6 ECOLOGY

Biology

Except for small grassy areas buildings and asphalt cover the SLAAP property Most vegetative growth on the site is volunteer weeds and small trees The site serves as a habitat for a variety of insects and occasional mammals (opossum raccoon etc) typical of vacant property/buildings in an urban area

Endangered Species

No endangered or threatened species have been identified on the property According to the Missouri Department of Conservation the transfer outgrant or disposal of the SLAAP property will not impact any endangered species or cause sensitive environment concerns in the vicinity of the property (Missouri Department of Conservation 1993)

Wetlands

A 1994 National Wetlands Inventory map of the area within 2 miles of SLAAP was reviewed to identify surface water bodies and wetlands According to the map, the closest wetland is approximately 1 4 miles east of SLAAP and another wetland lies approximately 1 5 miles northwest of SLAAP No wetlands were identified on the SLAAP property or in its immediate vicinity (EDR 1999)

3 7 SITE LAND USE

General

SLAAP is located along I 70 within the boundaries of St Louis Missouri The surrounding area is comprised of a mixture of residential commercial and light industrial applications as well as area schools parks and daycare facilities

Archeology

SLAAP is located across the Mississippi River from the American Bottoms archeological region In 1985 an archeological overview and management plan was prepared for SLAAP According to the plan no known or identifiable potential archeological sites are located on the SLAAP property Most of the SLAAP property is asphalt paved or covered by structures therefore some type of ground disturbance has impacted most of it It is doubtful that any surficial archeological sites remain on the SLAAP property However the existence of subsurface archeological deposits is possible (Woodward Clyde Consultants 1985)

A letter from the MDNR Division of State Parks dated June 21 1994 indicates that none of the SLAAP structures are eligible for inclusion on the National Registry of Historic Places (MDNR 1994)

This section presents the nature and extent of contamination based on the screening levels developed in the FSP for implementation during the SSEBS Except for metals and PAHs (discussed below) the FSP screening levels were based on the lower value from the EPA Region IX Residential PRGs established in 2000 and the MDNR CALM Scenario A contaminant levels established in 2001 which are based on conservative residential exposures

Regional background soil samples were collected as described in **Section 2 15** to establish background concentrations of metals and PAHs in the vicinity of SLAAP The regional background contaminant level was taken to be the 95% upper tolerance limit for 95% of observations but this value was calculated only after examination of the background data and removal of data points which were considered to be outliers (Hogg 1987) The determination of which data points were outliers was made with Dixon s Extreme Value Test and the data determined not to be outliers were confirmed to be normally distributed by the Studentized Range Test (EPA 1998b) Non detect values were input as one half of the reporting limit unless the laboratory consistently reported estimated detections at least an order of magnitude below the reporting limit in which case the non detect values were excluded For analytes where most data points were excluded or non detect no background levels were calculated These background levels were used as screening levels for metals and PAHs if they were greater than the lower value between the PRG and CALM **Table 4 1** presents the analytical data from the background soil sampling for metals and PAHs and the background concentration based on the statistically determined 95% upper tolerance limit

Although EPA Region IX issued a revised set of PRG values in 2002 after the SAP was issued the screening levels were not modified for the CSP However the 2002 PRGs are being used for screening the data in the SSEBS and HHRA because they represent the most current guidance available The most significant change due to the use of the current PRGs is the increase in the screening level for 1 1 DCE Several detections of 1 1 DCE were investigated under the CSP because they exceeded the original screening level based on the 2000 PRGs However no 1 1 DCE concentrations exceeded the revised screening level during either sampling event Therefore 1 1 DCE detections even though originally triggering further investigation under the CSP are now all below the screening level and require no further discussion

Additional screening levels that have been identified for this SSEBS and the HHRA include

- 1% asbestos fibers for ACM (EPA 1987)
- 10 ppm for PCBs in concrete (MDNR 2001)
- 50 mg/kg for PCBs in mastic and product samples (EPA 1998a)
- 10 ug/100 cm^2 for PCBs in surface wipe samples (EPA 1998a)

Screening levels for dioxins remain unchanged from the FSP however the method of calculating the toxicity equivalency quotient (TEQ) has been revised The TEQ is calculated by taking the sum of the products from multiplying each of the compound concentrations by the associated toxic equivalent factor (TEF) TEF values published in 1988 by the EPA were originally used to calculate the TEQ for each sample However the World Health Organization (WHO) published revised TEFs in 1997 which have been used for calculating the TEQ for samples in this SSEBS and the HHRA

Guidance on screening levels for sediments was not available therefore the sediment results are compared to the soil screening levels Groundwater and wastewater sample results are compared to the water screening levels Although the PRG and CALM values were not developed for evaluating wastewater quality they serve as a very conservative screening level for the wastewater found in the SLAAP sewer system

Updated screening levels for compounds in soil water and miscellaneous media are presented in **Tables 4-2 4-3** and **4-4** respectively Analytical laboratory results are statistically summarized in **Table 4-5** for the entire Site and in **Tables 4 6** through **4-17** and **4-19** for each Investigation Area These tables present all of the chemicals with detectable concentrations within the Site or Investigation Area and the screening level the maximum concentration and the Sample ID for the sample or samples with the maximum concentration Also included in these tables are the frequency of detections frequency of detections above the screening level minimum concentration detected above the screening level and ratio of the maximum concentration to the screening level **Table 4 18** presents the results of all water level measurements collected during both the initial and CSP sampling events Ground surface elevation top of casing elevation and calculated groundwater elevation are also shown in this table **Figures 4-1** and **4-2** show the groundwater surfaces for the two rounds of water levels collected during the CSP Tables of all analytical results by sample media and Investigation Area are presented in **Appendix C**

4 1 BUILDING 1

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Building 1 Investigation Area is presented in **Section 2 1** Sample locations for the Building 1 Investigation Area are shown in **Figure 2-2** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Building 1 Investigation Area is presented in **Table 4-6** All analytical data collected from samples in the Building 1 Investigation Area are presented in **Appendix C Tables C-1a** for soils and **C-2** for concrete

4 1 1 Concrete

PCB 1254 was detected in one of the two samples but at a concentration below the screening level

4 1 2 Soil

PCB 1254 was detected in one of the fifty one samples at a concentration above the screening level This sample was collected from the 0 to 0 5 foot bgs interval from boring location 01SB 10 in the southeast corner of the building PCB 1254 was not detected in any of the three samples collected from the 0 to 0 5 foot bgs interval from boring locations 01SB 10A 01SB 10B and 01SB 10C as part of the CSP Therefore samples from these locations along with the sample from the 0 to 0 5 foot bgs interval from boring location 01SB 11 define the extent of PCB contamination

Six different PAHs were detected in two of the thirty three samples at concentrations above the screening levels Both samples were collected from the 0 to 0 5 foot bgs interval from boring

locations RA 01SB 03 and RA 01SB 04 in the parking lot (former billet yard) west of Building 1 The extent of PAH contamination is defined by samples from the 0 to 0 5 foot bgs interval from boring locations RA 01SB 02 RA 01SB 05 RA NESB 06 RA RRSB 05 and RA RRSB 06

Arsenic was detected in one of the sixty nine samples at a concentration above the screening level The sample was collected from the 0 to 0 5 foot bgs interval from boring location 01SB 15 southeast of Building 1 Arsenic was detected in the only sample collected from the 0 to 0 5 foot bgs interval from boring location 01SB 15A as part of the CSP but at a concentration below the screening level Therefore this sample along with samples collected from the 0 to 0 5 foot bgs from boring locations RA 01SB 08 RA 01SB 09 and RA RRSB 07 define the extent of contamination

Copper was detected in one of the sixty nine samples at a concentration above the screening level The sample was collected from the 0 to 0 5 foot bgs interval from boring location RA 01SB 03 in the parking lot (former billet yard) west of Building 1 Samples collected from the 0 to 0 5 foot bgs interval from boring locations RA 01SB 02 and RA 01SB 04 define the eastern and western extents of contamination The northern and southern extents of contamination are not defined and may extend beyond the former billet yard however process knowledge suggests that metal contamination from storage of steel billets is not expected to extend beyond the edges of the former billet yard Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of additional copper contamination in this area

Field ID	Analyte	Result	Screening Level	Units
PCBs				
01SB-10(0 0 5) 0802	PCB 1254	0 35	0 22	MG/KG
	Total PCB	0 35	0 22	MG/KG
PAHs				
RA 01SB 03(0 0 5) 0802	Benzo(a)anthracene	1 7	0 887	MG/KG
	Benzo(a)pyrene	1 2	0 735	MG/KG
	Benzo(b)fluoranthene	1 7	0 626	MG/KG
	Benzo(g h i)perylene	0 81	0 478	MG/KG
	Indeno(1 2 3 cd)pyrene	0 7	0 62	MG/KG
	Phenanthrene	2 8	1 04	MG/KG
RA 01SB 04(0 0 5) 0802	Benzo(b)fluoranthene	0 7	0 626	MG/KG
	Phenanthrene	1 7	1 04	MG/KG
Metals				
01SB 15(0-0 5) 0802	Arsenic	14	13 2	MG/KG
RA 01SB 03(0 0 5) 0802	Copper	1260	1100	MG/KG

* Value calculated by URS

4 2 BUILDING 2

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Building 2 Investigation Area is presented in **Section 2 2** Sample locations for the Building 2 Investigation Area are shown in **Figure 2-3** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Building 2 Investigation Area is presented in **Table 4-7** All analytical data collected from samples in the Building 2 Investigation Area are presented in **Appendix C Tables C-1b** for soils **C-2** for concrete **C-4** for products and **C-10** for asbestos

4 2 1 Asbestos Containing Materials

All twenty refractory brick sample results were below the screening level

4 2 2 Concrete

PCBs were detected in all ten of the concrete samples however only one sample 02CS 01(0 0 1) 0802 in the northwest corner of the building had a concentration above the screening level Depending on the future uses of the Site additional studies may be warranted to further evaluate the extent of PCB contamination in the concrete

Field ID	Analyte	Result	Screening Level	Units
PCBs				
02CS-01(0 0 1) 0802	Total PCB	10 2	10	MG/KG

* Value calculated by URS

4 2 3 Product

PCBs were detected in one of the two product samples but at a concentration below the screening level

4 2 4 Soil

PCB 1248 was detected in five of the 110 samples at concentrations above the screening level Three of these samples were from the 0 to 0 5 foot bgs interval from boring locations RA 02SB 01 in the northwest corner of the building 02TS 02 in the northwestern portion of the building and 02TS 08 on the eastern edge of the building The fourth sample was from the 0 to 0 5 foot bgs interval from boring location 02TS 09 located in a 6 foot deep equipment sump in the center southeastern portion of the building Therefore this sample is actually located 7 feet below the elevation of the building floor The fifth sample was collected from the 9 to 10 feet bgs interval from boring location 02SB 01 in the northeast corner of the building These samples are throughout the building and at depths between 1 and 10 feet below the floor elevation Therefore the CSP samples collected around the exterior of Building 2 define the extent of PCB contamination

Dioxin analysis was performed under two different scenarios during the two sampling events During the initial sampling event only samples with detectable concentrations of PCBs were analyzed for dioxins This resulted in forty samples being analyzed for dioxins of which twenty nine had detected concentrations above the screening level All thirty samples collected from the Building 2 Investigation Area outside the building foundation during the CSP were analyzed for dioxins and none of these samples had concentrations above the screening level Overall seventy samples were analyzed for dioxins and twenty nine (41%) of these had concentrations above the screening level These samples are throughout the building and at depths between 1 and 18 feet below the floor elevation (samples deeper than 11 feet were collected from below equipment sumps) Therefore the CSP samples collected around the exterior of Building 2 define the extent of dioxin contamination

Beryllium was detected in one of the sixty nine samples at a concentration above the screening level This sample was collected from the 12 to 13 feet bgs interval from boring location 02TS 01 along the western edge of the building Beryllium was detected in all 583 Site wide soil samples analyzed for metals and forty of these results were above the screening level which was based on the background beryllium concentration Based on these findings beryllium is considered to be present throughout the Site possibly due to naturally occurring metals in the native clays and therefore the extent is Site wide

Lead was detected in one of the sixty nine samples at a concentration above the screening level This sample was collected from the 0 to 0 5 foot bgs interval from boring location RA 02SB 01 in the northwest corner of the building The extent of contamination is defined by samples from boring locations RA 02SB 02 RA 02SB 04 RA RDSB 02 and RA RDSB 01

TPH DRO was detected in seven of the thirty two samples at concentrations above the screening level These samples were from all areas of the building and depths from 0 to 10 feet bgs Therefore the extent of contamination is defined by samples from boring locations RA 02BS 04 RA 02SB 08 RA 02SB 11 RA 08SB 01 RA 08SB 17 RA RDSB 01 RA RDSB 02 and RA RDSB 03

Depending on the future uses of the Site the vertical extent of contamination may also require additional studies in borings where contamination exceeded the Screening Levels in the deepest sample from that boring as indicated by ** after the Field ID in the following table

Field ID	Analyte	Result	Screening Level	Units
PCBs				
02SB 01(09 10) 0902**	PCB 1248	2 5	0 22	MG/KG
	Total PCB	2 5	0 22	MG/KG
02TS-02(0 0 5) 0802	PCB 1248	6 2	0 22	MG/KG
	Total PCB	6 2	0 22	MG/KG
02TS-08(0-0 5) 0902	PCB 1248	1 3	0 22	MG/KG
	Total PCB	1 3	0 22	MG/KG
02TS-09(0 0 5) 0802	PCB 1248	1	0 22	MG/KG
	Total PCB	1 023	0 22	MG/KG

Field ID	Analyte	Result	Screening Level	Units
PCBs (Cont)				
RA 02SB 01(0 0 5) 0902	PCB 1248	14	0 22	MG/KG
	Total PCB	14	0 22	MG/KG
Dioxins				
02SB 01(0 0 5) 0902	Dioxin TEQ	11 9	3 9	PG/G
02SB-01(09 10) 0902**	Dioxin TEQ	304	3 9	PG/G
02SB 02(0 0 5) 0902	Dioxin TEQ	96 4	3 9	PG/G
02SB 02(09 10) 0902**	Dioxin TEQ	7 62	3 9	PG/G
02SB-03(0-0 5) 0902	2 3 7 8 TCDD	15 9	3 9	PG/G
	Dioxin TEQ	95 5	3 9	PG/G
02SB 04(04 05) 0902	Dioxin TEQ	32 1	3 9	PG/G
02SB 04(09 10) 0902**	Dioxin TEQ	19 3	3 9	PG/G
02SB 05(04 05) 0802	Dioxin TEQ	8 23	3 9	PG/G
02SB-05(09 10) 0802	Dioxin TEQ	9 36	3 9	PG/G
02SB-08(0 0 5) 0802	Dioxin TEQ	97 3	3 9	PG/G
02SB 09(04 05) 0802	Dioxin TEQ	5 2	3 9	PG/G
02SB 09(09 10) 0802**	Dioxin TEQ	3 91	3 9	PG/G
02TS-02(0-0 5) 0802	Dioxin TEQ	84 3	3 9	PG/G
02TS-04(0 0 5) 0802	Dioxin TEQ	4 87	3 9	PG/G
02TS-05(0-0 5) 0902	Dioxin TEQ	203	3 9	PG/G
02TS-05(02 03) 0902	Dioxin TEQ	111	3 9	PG/G
02TS-05(04 05) 0902**	Dioxin TEQ	42 1	3 9	PG/G
02TS-07(0 0 5) 0902	Dioxin TEQ	83 5	3 9	PG/G
02TS 08(0 0 5) 0902	Dioxin TEQ	33 6	3 9	PG/G
02TS 09(0 0 5) 0802	Dioxin TEQ	36 1	3 9	PG/G
02TS-09(04 05) 0902	Dioxin TEQ	7 27	3 9	PG/G
RA 02SB 01(0 0 5) 0902	Dioxin TEQ	113	3 9	PG/G
RA 02SB 01(09 10)-0902**	Dioxin TEQ	45 9	3 9	PG/G
RA 02SB 02(0 0 5) 0902	2 3 7 8 TCDD	5	3 9	PG/G
	Dioxin TEQ	33 4	3 9	PG/G
RA 02SB 06(0 0 5) 0902	Dioxin TEQ	39 1	3 9	PG/G
RA 02SB 07(0-0 5) 0902	2 3 7 8 TCDD	4 5	3 9	PG/G
	Dioxin TEQ	82 2	3 9	PG/G
RA 02SB 09(0 0 5) 0902	Dioxin TEQ	9 7	3 9	PG/G
RA 02SB 10(0 0 5) 0902	Dioxin TEQ	16 9	3 9	PG/G
RA 02SB 10(04 05) 0902	Dioxin TEQ	59 5	3 9	PG/G

Field ID	Analyte	Result	Screening Level	Units
Metals				
02TS 01(12 13) 0902	Beryllium	1 2	1 01	MG/KG
RA 02SB-01(0 0 5) 0902	Lead	721	363	MG/KG
TPH				
02SB 01(09 10) 0902**	TPH	2405 5	200	MG/KG
02SB 04(04 05) 0902	TPH	3603 2	200	MG/KG
02SB 04(09 10) 0902**	TPH	2603 8	200	MG/KG
02TS-02(0-0 5) 0802	TPH	444 8	200	MG/KG
02TS-05(0-0 5) 0902	TPH	1300	200	MG/KG
02TS-05(02 03) 0902	TPH	1115	200	MG/KG
02TS-09(0 0 5) 0802	TPH	250	200	MG/KG

* Value calculated by URS

** Deepest sample from boring

4 2 5 Surface Wipes

PCBs were detected in the one wipe sample However since the sample obtained was of a solidified substance on a wire the surface area from which the sample was collected could not be determined Therefore no comparison with an established screening level is possible however the data are presented below for informational purposes

Field ID	Analyte	Result	Screening Level	Units
PCBs				
02SW 01 0902	PCB 1248	1 1	NA	UG
	Total PCBs	1 1	NA	UG

* Value calculated by URS

NA – Not Applicable (No Screening Level established)

4 3 BUILDING 4

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Building 4 Investigation Area is presented in **Section 2 3** Sample locations for the Building 4 Investigation Area are shown in **Figure 2-4** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Building 4 Investigation Area is presented in **Table 4-8** All analytical data collected from samples in the Building 4 Investigation Area are presented in **Appendix C Tables C-1c** for soils **C-2** for concrete and **C-3** for surface wipes

4 3 1 Concrete

PCBs were detected in two of the four concrete samples but at concentrations below the screening level

4 3 2 Soil

A total of six PAH compounds were detected in three of the twenty eight samples at concentrations above the respective screening levels in five samples Two of these samples were from the 0 to 0 5 foot bgs interval in boring locations RA 04SB 01 and RA 04SB 06 west of the building The third sample was from the 4 to 5 feet bgs interval from boring location RA 04SB 08 along the south wall inside the building All six PAHs were again detected in one of the two CSP samples at concentrations above the respective screening levels This sample was again from the 0 to 0 5 foot bgs interval from boring location RA 04SB 06B on the west side of the road west of Building 4 The extent of PAH contamination is defined around RA 04SB 08 by samples from boring locations RA 04SB 03 RA 04SB 08A and RA 04SB 09 The basement wall located between samples RA 04SB 07 and RA 04SB 08 completes the extent since the soil horizon in question does not exist west of this wall The PAH contamination west of Building 4 is not defined but may extend to the north to boring location RA RDSB 06E to the south and west property boundaries and east to the western foundation wall of Building 4 since the soil horizon in question does not exist east of this wall Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of additional PAH contamination in this area Sample locations which have not been defined vertically may also require additional study and have been marked in the table below with a '** after the Field ID to indicate the deepest sample at the given location

Beryllium was detected in four of the twenty eight samples at concentrations above the screening level All four samples were from borings located in the western basement portion of the building (RA 04SB 01A RA 04SB 02 and RA 04SB 06A) One sample was from the 0 to 0 5 foot bgs interval and the other three samples were from the 2 to 3 feet bgs interval Beryllium was detected in all 583 Site wide soil samples analyzed for metals and forty of these results were above the screening level which was based on the background beryllium concentration Based on these findings beryllium is considered to be present throughout the Site possibly due to naturally occurring metals in the native clays and therefore the extent is Site wide

Field ID	Analyte	Result	Screening Level	Units
PAHs				
RA 04SB 01(0-0 5) 0902	Benzo(a)anthracene	0 91	0 887	MG/KG
	Benzo(a)pyrene	0 78	0 735	MG/KG
	Benzo(b)fluoranthene	0 92	0 626	MG/KG
	Benzo(g h I)perylene	0 52	0 478	MG/KG
	Phenanthrene	1 3	1 04	MG/KG
RA 04SB-06(0 0 5) 0902	Benzo(a)anthracene	1 3	0 887	MG/KG
	Benzo(a)pyrene	0 91	0 735	MG/KG
	Benzo(b)fluoranthene	1 1	0 626	MG/KG
	Benzo(g h I)perylene	0 56	0 478	MG/KG
	Indeno(1 2 3-cd)pyrene	0 87	0 62	MG/KG
	Phenanthrene	1 6	1 04	MG/KG

Field ID	Analyte	Result	Screening Level	Units
PAHs (Cont)				
RA 04SB 06B(0 0 5) 0503	Benzo(a)anthracene	3 6	0 887	MG/KG
	Benzo(a)pyrene	4 1	0 735	MG/KG
	Benzo(b)fluoranthene	4 8	0 626	MG/KG
	Benzo(g h I)perylene	3	0 478	MG/KG
	Indeno(1 2 3 cd)pyrene	3 2	0 62	MG/KG
	Phenanthrene	4 4	1 04	MG/KG
RA 04SB 08(04 05) 0902**	Benzo(b)fluoranthene	0 7	0 626	MG/KG
Metals				
RA 04SB 01A(0 0 5) 0902	Beryllium	1 4	1 01	MG/KG
RA 04SB 01A(02 03) 0902**	Beryllium	1 3	1 01	MG/KG
RA 04SB-02(02 03) 0902	Beryllium	1 9	1 01	MG/KG
RA 04SB 06A(02 03) 0902**	Beryllium	1 3	1 01	MG/KG

** Deepest sample from boring

4 3 3 Surface Wipes

PCBs were detected in all four of the surface wipe samples but at concentrations below the screening level

4 4 BUILDING 5

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Building 5 Investigation Area is presented in **Section 2 4** Sample locations for the Building 5 Investigation Area are shown in **Figure 2-5** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Building 5 Investigation Area is presented in **Table 4-9** All analytical data collected from samples in the Building 5 Investigation Area are presented in **Appendix C Tables C-1d** for soils **C-3** for surface wipes and **C-9** for mastic

4 4 1 Mastic

PCBs were detected in all three of the mastic samples but at concentrations below the screening level

4 4 2 Soil

Two pesticide compounds 4 4 dichlorodiphenyldichloroethene (4 4 DDE) and 4 4 DDT were detected in one of the thirty two samples at concentrations above the respective screening levels This sample was collected from the 0 to 0 5 foot bgs interval from boring location RA 05SB 05 east of the tunnel entrance to Building 3 and concrete retaining wall The extent of contamination is defined by samples from adjacent boring locations RA 05SB 06 and RA 05SB 13 and the

concrete retaining wall and building foundation These two walls define the extent of contamination because they both extend below the depth of the 2 to 3 feet bgs sample which did not have any contaminants detected above the screening level

A total of eight PAH compounds were detected in two of the thirty five samples at concentrations above the respective screening levels One of the samples was collected from the 0 to 0 5 foot bgs interval from boring location RA 05SB 05 east of the tunnel entrance to Building 3 The other sample was collected from the 9 to 10 feet bgs interval from boring location 05SB 01 in the oil storage pad off the southwest corner of the building The extent of contamination is defined by samples from adjacent boring locations RA 05SB 06 and RA 05SB 13 and the concrete retaining wall and building foundation These two walls define the extent of contamination because they both extend below the depth of the 2 to 3 feet bgs sample which did not have any contaminants detected above the screening level The PAH contamination below the oil storage pad is defined by samples from boring locations 06SB 01 on the west and RA RDSB 10E on the northwest and may extend to the property boundary to the south and along the entire hillside south of Building 5 but could extend further Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of additional PAH contamination in this area Sample locations which have not been defined vertically may also require additional study and have been marked in the table below with a "** after the Field ID to indicate the deepest sample at the given location

Lead was detected in one of the thirty two samples at a concentration above the screening level This sample was collected from the 0 to 0 5 foot bgs interval from boring location RA 05SB 05 east of the tunnel entrance to Building 3 The extent of contamination is defined by samples from adjacent boring locations RA 05SB 06 and RA 05SB 13 and the concrete retaining wall and building foundation These two walls define the extent of contamination because they both extend below the depth of the 2 to 3 feet bgs sample which did not have any contaminants detected above the screening level

Field ID	Analyte	Result	Screening Level	Units
Pesticides				
RA 05SB 05(0 0 5) 0902	4 4 DDE	65 J	1 7	MG/KG
	4 4 DDT	1100 J	1 7	MG/KG
PAHs				
05SB 01(09 10) 0902**	Benzo(a)anthracene	1 6	0 887	MG/KG
	Benzo(a)pyrene	1 3	0 735	MG/KG
	Benzo(b)fluoranthene	1 7	0 626	MG/KG
	Benzo(g h i)perylene	0 87	0 478	MG/KG
	Indeno(1 2 3 cd)pyrene	0 8	0 62	MG/KG
	Phenanthrene	3	1 04	MG/KG

Field ID	Analyte	Result	Screening Level	Units
PAHs (Cont)				
RA 05SB 05(0 0 5) 0902	Benzo(a)anthracene	25 J	0 887	MG/KG
	Benzo(a)pyrene	19 J	0 735	MG/KG
	Benzo(b)fluoranthene	16 J	0 626	MG/KG
	Benzo(g h ı)perylene	14 J	0 478	MG/KG
	Benzo(k)fluoranthene	19 J	6 2	MG/KG
	Dıbenz(a h)anthracene	7 1 J	0 303	MG/KG
	Indeno(1 2 3 cd)pyrene	11 J	0 62	MG/KG
	Phenanthrene	33 J	1 04	MG/KG
Metals				
RA 05SB 05(0 0 5) 0902	Lead	1790	363	MG/KG

** Deepest sample from borıng

4 4 3 Surface Wıpes

PCBs were detected ın the surface wıpe sample but at concentratıons below the screenıng level

4 5 BUILDING 6

All samples were collected as part of the ınıtıal samplıng event unless otherwıse noted An explanatıon of CSP samplıng ratıonale for the Buildıng 6 Investıgatıon Area ıs presented ın **Sectıon 2 5** Sample locatıons for the Buildıng 6 Investıgatıon Area are shown ın **Fıgure 2-6** Samples wıth compounds detected at concentratıons above the screenıng level are presented ın tabular form followıng each dıscussıon A statıstıcal summary of all compounds detected ın the Buildıng 6 Investıgatıon Area ıs presented ın **Table 4-10** All analytıcal data collected from samples ın the Buildıng 6 Investıgatıon Area are presented ın **Appendıx C, Tables C-1e** for soıls **C-3** for surface wıpes **C-5** for sedıments and **C-9** for mastıc

4 5 1 Mastıc

PCBs were detected ın all three of the mastıc samples but at concentratıons below the screenıng level

4 5 2 Sedıment

Fıve metals (antımony, arsenıc chromıum lead and mercury) were detected ın the only sedıment sample collected ın the old HVAC duct system at concentratıons above the respectıve soıl screenıng levels However no regulatory guıdance has been establıshed for these analytes from a sedıment sample but the results are presented below for ınformatıonal purposes

Field ID	Analyte	Result	Screening Level	Units
Metals				
06SD 01 0902	Antimony	66	31	MG/KG
	Arsenic	23	13 2	MG/KG
	Chromium	222	210	MG/KG
	Lead	2610	363	MG/KG
	Mercury	3 6	0 6	MG/KG

4 5 3 Soil

The pesticide 4 4 DDT was detected in two of the twenty eight samples at concentrations above the screening level Both of these samples were collected from boring location RA 06SB 04 in the 0 to 0 5 and 2 to 3 feet bgs sample intervals 4 4 DDT was detected in the one sample collected from the 4 to 5 feet bgs interval from boring location RA 06SB 04A as part of the CSP but at a concentration below the screening level The extent of pesticide contamination is defined by samples from adjacent boring locations RA 06SB 05 and RA 06SB 12 The concrete retaining wall and building foundation wall complete the extent of contamination since the contaminated soils did not extend deeper than the bottom of the these walls Depending on the future uses of the Site, additional studies may be warranted to further evaluate the possibility of pesticide contamination in soils east of the partition wall

Mercury was detected in four of the twenty eight samples at concentrations above the screening level Three of these samples were collected from the 0 to 0 5 foot bgs interval from boring locations RA 06SB 02 RA 06SB 04 and RA 06SB 05 along the north wall in the basement The fourth sample was collected from the 2 to 3 feet bgs interval from boring location RA 06SB 04 Mercury was not detected in the one sample collected from the 4 to 5 feet bgs interval from boring location RA 06SB 04A as part of the CSP The extent of the mercury contamination in the basement of Building 6 is defined by samples collected from adjacent boring locations RA 06SB 01 RA 06SB 10 RA 06SB 12 RA 06SB 13 and RA 06SB 06 The building foundation wall completes the extent of contamination since the contaminated soils did not extend deeper than the bottom of the wall

Beryllium was detected in seven of the twenty eight samples at concentrations above the screening level Two of the samples were collected from the 0 to 0 5 foot bgs interval and the other five were collected from the 2 to 3 feet bgs interval These samples are spread throughout the western half of the basement Beryllium was detected in all 583 Site wide soil samples analyzed for metals and forty of these results were above the screening level which was based on the background beryllium concentration Based on these findings beryllium is considered to be present throughout the Site possibly due to naturally occurring metals in the native clays and therefore the extent is Site wide

Depending on the future uses of the Site the vertical extent of contamination may also require additional studies in borings where contamination exceeded the Screening Levels in the deepest sample from that boring as indicated by ** after the Field ID in the following table

Field ID	Analyte	Result	Screening Level	Units
Pesticides				
RA 06SB 04(0 0 5) 0902	4 4 DDT	4	1 7	MG/KG
RA 06SB 04(02 03) 0902	4 4 DDT	21	1 7	MG/KG
Metals				
RA 06SB 02(0 0 5) 0902	Mercury	1 5	0 6	MG/KG
RA 06SB 03(0 0 5) 0902	Beryllium	1 6	1 01	MG/KG
RA 06SB 03(02 03) 0902**	Beryllium	1 3	1 01	MG/KG
RA 06SB 04(0-0 5) 0902	Mercury	0 85	0 6	MG/KG
RA 06SB 04(02 03) 0902	Beryllium	1 1	1 01	MG/KG
	Mercury	0 92	0 6	MG/KG
RA 06SB 05(0 0 5) 0902	Mercury	0 94	0 6	MG/KG
RA 06SB-09(02 03) 0902**	Beryllium	1 1	1 01	MG/KG
RA 06SB 10(02 03) 0902**	Beryllium	1 3	1 01	MG/KG
RA 06SB 11(0 0 5) 0902	Beryllium	1 1	1 01	MG/KG
RA 06SB 11(02 03) 0902	Beryllium	1 2	1 01	MG/KG

** Deepest sample from boring

4 5 4 Surface Wipes

The one surface wipe sample collected in the old HVAC duct system had detections of sixteen SVOCs including eleven PAHs twelve of the fourteen metals (antimony results were rejected) and four VOCs No screening level has been established for these analytes from a surface wipe sample but the results are presented below for informational purposes

PCBs were detected in the other four surface wipe samples but all at concentrations below the screening level

Field ID	Analyte	Result	Screening Level	Units
Volatiles				
06SW 01 0902	1 3-Dichlorobenzene	0 01 J	NA	MG/FT2
	1 4 Dichlorobenzene	0 012 J	NA	MG/FT2
	Hexachlorobutadiene	0 065 J	NA	MG/FT2
	Toluene	0 014 J	NA	MG/FT2

Field ID	Analyte	Result	Screening Level	Units
	Semivolatiles			
06SW 01 0902	Anthracene	0 27 J	NA	UG/FT2
	Benzo(a)anthracene	0 96 J	NA	UG/FT2
	Benzo(a)pyrene	0 99 J	NA	UG/FT2
	Benzo(b)fluoranthene	2 J	NA	UG/FT2
	Benzo(g h ı)perylene	0 75 J	NA	UG/FT2
	Benzo(k)fluoranthene	0 69 J	NA	UG/FT2
	Bıs(2 ethylhexyl)phthalate	4 4 J	NA	UG/FT2
	Butyl benzyl phthalate	6 5	NA	UG/FT2
	Chrysene	1 7 J	NA	UG/FT2
	Dı n butylphthalate	3 6 J	NA	UG/FT2
	Dı n-octylphthalate	0 35 J	NA	UG/FT2
	Diethylphthalate	6 4	NA	UG/FT2
	Fluoranthene	4 3 J	NA	UG/FT2
	Indeno(1 2 3-cd)pyrene	0 7 J	NA	UG/FT2
	Phenanthrene	2 3 J	NA	UG/FT2
	Pyrene	2 2 J	NA	UG/FT2
	Metals			
06SW 01 0902	Arsenic	303	NA	UG/FT2
	Barium	415	NA	UG/FT2
	Beryllium	0 072 J	NA	UG/FT2
	Cadmium	43	NA	UG/FT2
	Chromium	450	NA	UG/FT2
	Copper	1400	NA	UG/FT2
	Lead	3390	NA	UG/FT2
	Mercury	1 7	NA	UG/FT2
	Nickel	210	NA	UG/FT2
	Selenium	208	NA	UG/FT2
	Silver	2 1	NA	UG/FT2
	Zinc	127000	NA	UG/FT2

NA – Not Applicable (No Screening Level established)

4 6 BUILDING 7

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Building 7 Investigation Area is presented in **Section 2 6** Sample locations for the Building 7 Investigation Area are shown in **Figure 2-7** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Building 7 Investigation Area is presented in **Table 4-11** All analytical data collected from

samples in the Building 7 Investigation Area are presented in **Appendix C Tables C-1f** for soils and **C-2** for concrete

4 6 1 Concrete

TPH DRO was detected in the only concrete sample at concentrations above the screening level

Field ID	Analyte	Result	Screening Level	Units
TPH				
07CS-01(0 0 1) 0802	TPH	2000	200	MG/KG

* Value calculated by URS

4 6 2 Soil

PCB 1254 was detected in one of the forty four samples at a concentration above the screening level This sample was collected from the 0 to 0 5 foot bgs interval from boring location RA 07SB 02 north of the former cooling tower location along the roadway PCB 1254 was not detected in the one sample collected at boring location RA 07SB 02A as part of the CSP Therefore the extent of PCB contamination is defined on all sides by samples from adjacent boring locations RA 07SB 01 RA 07SB 02A RA 07SB 03 and RA 07SB 06

A total of six different PAH compounds were detected in seven of the forty four samples at concentrations above the respective screening levels These samples were all collected from the 0 to 0 5 foot bgs interval in the northern half of the open grassy portion of the Investigation Area The extent of contamination is defined by the samples collected from boring locations RA 07SB 10 RA 07SB 11 RA 07SB 12 and RA RDSB 08E and the foundation walls for Buildings 4 and 6 since they extend deeper than the contaminated sample depths

Beryllium was detected in two of the forty four samples at concentrations above the screening level These samples were collected from the 9 to 10 feet bgs interval from boring location RA 07SB 13 and the 4 to 5 feet bgs interval from boring location RA 07SB 15 Both of the boring locations are along the southern boundary of the property south of the pump house and former cooling tower locations Beryllium was detected in all 583 Site wide soil samples analyzed for metals and forty of these results were above the screening level which was based on the background beryllium concentration Based on these findings beryllium is considered to be present throughout the Site possibly due to naturally occurring metals in the native clays, and therefore the extent is Site wide

Lead was detected in one of the forty four samples at a concentration above the screening level This sample was collected from the 0 to 0 5 foot bgs interval from boring location RA 07SB 15 south of the former cooling tower The extent of contamination is defined by samples from adjacent boring locations RA 07SB 11 RA 07SB 14 and RA 07SB 16 and may extend to the property boundary to the south but could extend further Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of additional contamination in this area

Depending on the future uses of the Site the vertical extent of contamination may also require additional studies in borings where contamination exceeded the Screening Levels in the deepest sample from that boring as indicated by ** after the Field ID in the following table

Field ID	Analyte	Result	Screening Level	Units
	PCBs			
RA 07SB 02(0 0 5) 0902	PCB-1254	0 34	0 22	MG/KG
	Total PCB	0 34	0 22	MG/KG
	PAHs			
RA 07SB 01(0 0 5) 0902	Benzo(a)anthracene	3 8	0 887	MG/KG
	Benzo(a)pyrene	2 8	0 735	MG/KG
	Benzo(b)fluoranthene	4	0 626	MG/KG
	Benzo(g h i)perylene	1 9	0 478	MG/KG
	Indeno(1 2 3 cd)pyrene	1 7	0 62	MG/KG
	Phenanthrene	3	1 04	MG/KG
RA 07SB 02(0 0 5) 0902	Benzo(a)anthracene	2	0 887	MG/KG
	Benzo(a)pyrene	1 6	0 735	MG/KG
	Benzo(b)fluoranthene	2 1	0 626	MG/KG
	Benzo(g h i)perylene	1 2	0 478	MG/KG
	Indeno(1 2 3-cd)pyrene	0 97	0 62	MG/KG
	Phenanthrene	2 5	1 04	MG/KG
RA 07SB 03(0-0 5) 0902	Benzo(a)anthracene	1 2	0 887	MG/KG
	Benzo(a)pyrene	0 91	0 735	MG/KG
	Benzo(b)fluoranthene	1 2	0 626	MG/KG
	Benzo(g h i)perylene	0 72	0 478	MG/KG
	Indeno(1 2 3 cd)pyrene	0 62	0 62	MG/KG
RA 07SB 04(0-0 5) 0902	Benzo(b)fluoranthene	0 79	0 626	MG/KG
RA 07SB 06(0 0 5) 0902	Benzo(b)fluoranthene	0 7	0 626	MG/KG
	Phenanthrene	1 2	1 04	MG/KG
RA 07SB-07(0 0 5) 0902	Benzo(a)anthracene	0 9	0 887	MG/KG
	Benzo(a)pyrene	0 77	0 735	MG/KG
	Benzo(b)fluoranthene	0 9	0 626	MG/KG
	Benzo(g h i)perylene	0 5	0 478	MG/KG
	Phenanthrene	1 2	1 04	MG/KG
RA 07SB 08(0-0 5) 0902	Benzo(b)fluoranthene	0 89	0 626	MG/KG
	Benzo(g h i)perylene	0 51	0 478	MG/KG

Field ID	Analyte	Result	Screening Level	Units
Metals				
RA 07SB 13(09 10) 0902**	Beryllium	1 3	1 01	MG/KG
RA 07SB 15(0 0 5) 0902	Lead	900	363	MG/KG
RA 07SB 15(04 05) 0902	Beryllium	1 1	1 01	MG/KG

* Value calculated by URS

** Deepest sample from boring

4 7 BUILDING 8

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Building 8 Investigation Area is presented in **Section 2 7** Sample locations for the Building 8 Investigation Area are shown in **Figure 2 8** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Building 8 Investigation Area is presented in **Table 4-12** All analytical data collected from samples in the Building 8 Investigation Area are presented in **Appendix C Tables C 1g** for soils and **C-5** for sediment

4 7 1 Sediment

TPH DRO was detected in one of the two sediment samples from the utility trench but at a concentration below the screening level

4 7 2 Soil

TPH DRO was detected in one of the twenty three samples at a concentration above the screening level This sample was collected from the 7 to 8 feet bgs interval from boring location 08SB 07 at the southern end of the pipe trench between Buildings 8 and 2 TPH DRO was detected in both of the samples collected from boring locations 08SB 07A and 08SB 07B as part of the CSP but at concentrations below the screening level The extent of contamination is defined by samples collected from boring locations 08SB 06 08SB 07A 08SB 07B and RA 08SB 09

A total of five PAH compounds were detected in three of the sixty one samples at concentrations above the respective screening levels All three of these samples were collected from the 4 to 5 feet bgs interval from boring locations RA 08SB 06 RA 08SB 07 and RA 08SB 16 One additional sample was collected from boring location RA 08SB 16A as part of the CSP but acenaphthylene was not detected The extent of contamination around boring locations RA 08SB 06 and RA 08SB 07 is defined by samples from adjacent boring locations RA 08SB 02 RA 08SB 03 RA 08SB 05 RA 08SB 08 RA 08SB 10 and RA 08SB 11 The extent of contamination at RA 08SB 16 is defined by samples from adjacent boring locations RA 08SB 12 RA 08SB 15 RA 08SB 16A RA 08SB 20 and RA NESB 04

Field ID	Analyte	Result	Screening Level	Units
PAHs				
RA 08SB 06(04 05) 0902	Acenaphthylene	0 063 J	0 0305	MG/KG
	Phenanthrene	1 1	1 04	MG/KG
RA 08SB 07(04 05) 0902	Acenaphthylene	0 049 J	0 0305	MG/KG
	Benzo(a)anthracene	2	0 887	MG/KG
	Benzo(a)pyrene	0 99	0 735	MG/KG
	Benzo(g h ı)perylene	0 81	0 478	MG/KG
	Phenanthrene	2 6	1 04	MG/KG
RA 08SB-16(04 05) 0902	Acenaphthylene	0 096 J	0 0305	MG/KG
TPH				
08SB 07(07 08) 0902	TPH	1065	200	MG/KG

* Value calculated by URS

4 8 BUILDING 10

All samples were collected as part of the ınıtıal samplıng event unless otherwıse noted An explanatıon of CSP samplıng ratıonale for the Buildıng 10 Investıgatıon Area ıs presented ın **Sectıon 2 8** Sample locatıons for the Buildıng 10 Investıgatıon Area are shown ın **Fıgure 2-9** Samples wıth compounds detected at concentratıons above the screenıng level are presented ın tabular form followıng each dıscussıon A statıstıcal summary of all compounds detected ın the Buildıng 10 Investıgatıon Area ıs presented ın **Table 4-13** All analytıcal data collected from samples ın the Buildıng 10 Investıgatıon Area are presented ın **Appendıx C Tables C-1h** for soıls

4 8 1 Soıl

TPH DRO was detected ın nıne of the twenty samples but at concentratıons below the screenıng level However two Sewer System soıl samples collected from the 14 to 15 feet bgs ınterval wıthın the boundarıes of the Buildıng 10 Investıgatıon Area had detected concentratıons of TPH DRO above the screenıng level The extent of contamınatıon ıs defined by samples collected from borıng locatıons 10SB 06 10SB 08 10SB 09 and SRSB 16D and the boundary of the excavatıon from the demolıtıon of Buildıng 3

The followıng BETX compounds were detected ın one or more of the seventeen samples collected but at concentratıons below the screenıng levels ethylbenzene and xylenes ın four samples and benzene ın one sample

Field ID	Analyte	Result	Screening Level	Units
TPH				
SRSB-18(14 15) 0902	TPH	550	200	MG/KG
SRSB 19(14 15) 0902	TPH	600	200	MG/KG

* Value calculated by URS

In addition to the Building 10 samples additional samples were collected in the proximity of the former Building 10 Investigation Area from the Roadway Risk Assessment borings RA RDSB 13 13E & 14 These 9 samples were analyzed for heavy metals PAHs PCBs and VOCs with no detections above the Screening Levels Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of releases from these former USTs

4 9 NORTHEAST PARKING AREA

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Northeast Parking Area Investigation Area is presented in **Section 2 9** Sample locations for the Northeast Parking Area Investigation Area are shown in **Figure 2-10** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Northeast Parking Area Investigation Area is presented in **Table 4-14** All analytical data collected from samples in the Northeast Parking Area Investigation Area are presented in **Appendix C Tables C-1i** for soils

4 9 1 Soil

Six PAH compounds were detected in one of the twenty four samples at concentrations above the respective screening levels This sample was collected from the 0 to 0 5 foot bgs interval from boring location RA NESB 01 in the northwestern portion of the parking area None of the six PAHs from the original sample were detected in the one sample (RA NESB 01A) that was collected as part of the CSP Therefore the extent of contamination is defined by samples from adjacent boring locations RA 08SB 08 RA 08SB 12 RA NESB 01A and RA NESB 02

Field ID	Analyte	Result	Screening Level	Units
PAHs				
RA NESB 01(0 0 5) 0802	Benzo(a)anthracene	2 2	0 887	MG/KG
	Benzo(a)pyrene	1 8	0 735	MG/KG
	Benzo(b)fluoranthene	2 5	0 626	MG/KG
	Benzo(g h i)perylene	1 3	0 478	MG/KG
	Indeno(1 2 3 cd)pyrene	1 1	0 62	MG/KG
	Phenanthrene	4 6	1 04	MG/KG

4 10 RAILROADS

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Railroad Investigation Area is presented in **Section 2 10** Sample locations for the Railroads Investigation Area are shown in **Figure 2-11** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Railroad Investigation Area is presented in **Table 4-15** All analytical data collected from samples in the Railroad Investigation Area are presented in **Appendix C Tables C-1j** for soils

4 10 1 Soil

Beryllium was detected in one of the thirty three samples at a concentration above the screening level This sample was collected from the 9 to 10 feet bgs interval from boring location RA RRSB 02 south of Building 2 Beryllium was detected in all 583 Site wide soil samples analyzed for metals and forty of these results were above the screening level which was based on the background beryllium concentration Based on these findings beryllium is considered to be present throughout the Site possibly due to naturally occurring metals in the native clays and therefore the extent is Site wide

TPH DRO was not analyzed in any of the railroad soil samples However TPH DRO was detected above the Screening Level in one sewer soil sample SRSB 16(06-07) 0902 in close proximity to the railroad line southeast of Building 1 All four samples collected as part of the CSP at boring locations SRSB 16A SRSB 16B SRSB 16C and SRSB 16D had concentrations of TPH DRO below the screening level and therefore define the extent of contamination

Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of additional contamination in these areas Sample locations which have not been defined vertically may also require additional study and have been marked in the table below with a "** after the Field ID to indicate the deepest sample at the given location

Field ID	Analyte	Result	Screening Level	Units
Metals				
RA RRSB-02(09 10) 0802	Beryllium	1 3	1 01	MG/KG
TPH				
SRSB 16(06 07) 0902	TPH	530	200	MG/KG

* Value calculated by URS

** Deepest sample from boring

4 11 ROADWAYS

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Roadway Investigation Area is presented in **Section 2 11** Sample locations for the Roadways Investigation Area are shown in **Figure 2-12** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Roadway Investigation Area is presented in **Table 4-16** All analytical data collected from samples in the Roadway Investigation Area are presented in **Appendix C-Tables C-1k** for soils

4 11 1 Soil

Five PAH compounds were detected in one of the ninety six samples at concentrations above the respective screening levels This sample was collected from the 9 to 10 feet bgs interval from boring location RA RDSB 02 northwest of Building 2 The roadway edge sample RA RDSB 02E defines the northern extent of contamination and Building 2 defines the southern extent PAHs were not detected in the two additional samples collected from boring locations

RA RDSB 02A and RA RDSB 02B as part of the CSP Therefore these locations define the eastern and western extent of the PAH contamination in this area

Antimony was detected in one of the ninety six samples collected at a concentration above the screening level This sample was collected from the 0 to 0 5 foot bgs interval from boring location RA RDSB 16E west of the Building 1 Investigation Area and south of the Building 8 Investigation Area Antimony was not detected in any of the three samples collected from boring locations RA RDSB 16EA RA RDSB 16EB and RA RDSB 16EC as part of the CSP Therefore the extent of contamination is defined by the samples from boring locations RA RDSB 16 RA RDSB 16EA RA RDSB 16EB and RA RDSB 16EC

Beryllium was detected in five of the ninety six samples collected at concentrations above the screening level Two of these samples were collected from the 4 to 5 and 9 to 10 feet bgs intervals from boring location RA RDSB 06 The other three were collected from the 0 to 0 5 4 to 5 and 9 to 10 feet bgs intervals from boring location RA RDSB 06E Both of these boring are located in the roadway at the western corner between Buildings 3 and 4 Beryllium was detected in all 583 Site wide soil samples analyzed for metals and forty of these results were above the screening level which was based on the background beryllium concentration Based on these findings beryllium is considered to be present throughout the Site possibly due to naturally occurring metals in the native clays and therefore the extent is Site wide

Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of additional contamination in these areas Sample locations which have not been defined vertically may also require additional study and have been marked in the table below with a '** after the Field ID to indicate the deepest sample at the given location

Field ID	Analyte	Result	Screening Level	Units
PAHs				
RA RDSB 02(09 10) 0802**	Benzo(a)anthracene	1 2	0 887	MG/KG
	Benzo(a)pyrene	1 1	0 735	MG/KG
	Benzo(b)fluoranthene	1 5	0 626	MG/KG
	Benzo(g h i)perylene	0 56	0 478	MG/KG
	Phenanthrene	1 6	1 04	MG/KG
Metals				
RA RDSB 06(04 05) 0802	Beryllium	2	1 01	MG/KG
RA RDSB 06(09 10) 0802**	Beryllium	1 2	1 01	MG/KG
RA RDSB 06E(0-0 5) 0802	Beryllium	6 7	1 01	MG/KG
RA RDSB-06E(04 05) 0802	Beryllium	1 1	1 01	MG/KG
RA RDSB 06E(09 10) 0802	Beryllium	1 5	1 01	MG/KG
RA RDSB 16E(0 0 5) 0802	Antimony	34	31	MG/KG

** Deepest sample from boring

4 12 SEWERS

All samples were collected as part of the initial sampling event unless otherwise noted An explanation of CSP sampling rationale for the Sewer Investigation Area is presented in **Section**

2 12 Sample locations for the Sewer Investigation Area are shown in **Figure 2-13** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Sewer Investigation Area is presented in **Table 4-17** All analytical data collected from samples in the Sewer Investigation Area are presented in **Appendix C Tables C-11** for soils, **C-6** for sediments and **C-7** for wastewater

4 12 1 Sediment

Dioxins were detected in the only sample SRSD 02 north of Building 2 collected as part of the CSP at concentrations above the respective soil screening levels

PCBs were detected in all five of the samples at concentrations above the soil screening level PCBs were also detected in the one sample SRSD 02 north of Building 2 collected as part of the CSP at concentrations above the soil screening level

A total of nine PAH compounds were detected in all three of the samples at concentrations above the respective soil screening levels Di n octylphthalate was detected in one (SRSD 02 north of Building 2) of the three samples at a concentration above the soil screening level

The following metals were detected at concentrations above the soil screening levels in one or more of the five samples collected

- antimony in four samples (02SD 01 02SD 02 SRSD 02 and SRSD 03)
- arsenic in three samples (02SD 01, SRSD 02 and SRSD 03)
- chromium in three samples (02SD 02 SRSD 02 and SRSD 03)
- lead in two samples (SRSD 02 and SRSD 04)
- mercury in one sample (SRSD 03) and
- copper in one sample (SRSD 02)

TPH DRO was detected in all five samples at concentrations above the soil screening level

The following VOCs were detected at concentrations above the soil screening levels in one or more of the five samples collected

- chloroethane in two samples (02SD 01 and SRSD 02)
- trichloroethene (TCE) in two samples (02SD 02 and SRSD 03)
- 1 1 1 trichloroethane (1 1 1 TCA) in one sample (02SD 02)
- 1 1 dichloroethane (1 1 DCA) in one sample (02SD 02)
- 1 2 dichloroethane (1 2 DCA) in one sample (02SD 02)
- methylene chloride in one sample (02SD 02) and
- vinyl chloride (VC) in one sample (SRSD 02)

Di n octylphthalate copper and mercury had isolated detections above the screening levels in the sewer system sediment samples Other contaminants detected above the screening levels in the sewer sediments appear to be Site wide within the sewer system

Field ID	Analyte	Result	Screening Level	Units
Dioxins				
SRSD 02 0503	2 3 7 8 TCDD	390	3 9	PG/G
	Dioxin TEQ	2180	3 9	PG/G
PCBs				
02SD 01 0802	PCB 1248	19 J	0 22	MG/KG
	PCB 1260	1 8 J	0 22	MG/KG
	Total PCB	20 8	0 22	MG/KG
02SD 02 0802	PCB 1248	3 2	0 22	MG/KG
	PCB 1260	0 34 J	0 22	MG/KG
	Total PCB	3 54	0 22	MG/KG
SRSD 02 0802	PCB 1248	48	0 22	MG/KG
	PCB 1260	1 4 J	0 22	MG/KG
	Total PCB	49 4	0 22	MG/KG
SRSD 02 0503	PCB 1248	5 3 J	0 22	MG/KG
	Total PCB	5 3	0 22	MG/KG
SRSD 03 0802	PCB 1248	10 J	0 22	MG/KG
	Total PCB	10	0 22	MG/KG
SRSD 04 0802	PCB 1248	14	0 22	MG/KG
	Total PCB	14 085	0 22	MG/KG
Semivolatiles				
SRSD 02 0802	Benzo(a)pyrene	0 98 J	0 735	MG/KG
	Di n octylphthalate	2 J	0 3	MG/KG
	Phenanthrene	10	1 04	MG/KG
SRSD 03-0802	Benzo(a)anthracene	2 1 J	0 887	MG/KG
	Benzo(a)pyrene	0 94 J	0 735	MG/KG
	Benzo(b)fluoranthene	2 6 J	0 626	MG/KG
	Benzo(g h i)perylene	2 2 J	0 478	MG/KG
	Indeno(1 2 3 cd)pyrene	1 6 J	0 62	MG/KG
	Phenanthrene	5 4 J	1 04	MG/KG

Field ID	Analyte	Result	Screening Level	Units
Semivolatiles (Cont)				
SRSD 04 0802	Acenaphthylene	0 59 J	0 0305	MG/KG
	Benzo(a)anthracene	80	0 887	MG/KG
	Benzo(a)pyrene	66	0 735	MG/KG
	Benzo(b)fluoranthene	100	0 626	MG/KG
	Benzo(g h i)perylene	44	0 478	MG/KG
	Benzo(k)fluoranthene	40	6 2	MG/KG
	Chrysene	88	36	MG/KG
	Dibenz(a h)anthracene	11	0 303	MG/KG
	Indeno(1 2 3 cd)pyrene	37	0 62	MG/KG
	Phenanthrene	190	1 04	MG/KG
Metals				
02SD 01 0802	Antimony	42	31	MG/KG
	Arsenic	31	13 2	MG/KG
02SD 02 0802	Antimony	39	31	MG/KG
	Chromium	215	210	MG/KG
SRSD 02 0802	Antimony	39	31	MG/KG
	Arsenic	26	13 2	MG/KG
	Chromium	360	210	MG/KG
	Lead	424	363	MG/KG
	Mercury	5 24	0 6	MG/KG
SRSD 03 0802	Antimony	55	31	MG/KG
	Arsenic	25	13 2	MG/KG
	Chromium	216	210	MG/KG
	Copper	1290	1100	MG/KG
SRSD 04 0802	Lead	3660	363	MG/KG
TPH				
02SD 01 0802	TPH	14032	200	MG/KG
02SD 02 0802	TPH	14530	200	MG/KG
SRSD 02 0802	TPH	37060	200	MG/KG
SRSD 03 0802	TPH	12066	200	MG/KG
SRSD 04 0802	TPH	6340	200	MG/KG

Field ID	Analyte	Result	Screening Level	Units
Volatiles				
02SD 01 0802	Chloroethane	3	3	MG/KG
02SD 02 0802	1 1 1 Trichloroethane	3900	1200	MG/KG
	1 1 Dichloroethane	640	510	MG/KG
	1 2 Dichloroethane	0 98	0 28	MG/KG
	Methylene chloride	22 J	9 1	MG/KG
	Trichloroethene	0 52	0 053	MG/KG
SRSD 02 0802	Chloroethane	36	3	MG/KG
	Vinyl chloride	0 13	0 079	MG/KG
SRSD 03 0802	Trichloroethene	0 13	0 053	MG/KG

* Value calculated by URS

4 12 2 Wastewater

PCB 1248 was detected in all 10 of the samples at concentrations above the screening level

Benzidize (a SVOC) was detected in one of the eight samples (SRWW 10) at a concentration above the screening level A total of seven PAH compounds were detected in seven of the eight samples (all except SRWW 07) at concentrations above the respective screening levels

Of the ten samples collected the following metals were detected in one or more of the samples at concentrations above the screening levels arsenic in all ten samples lead in eight samples (all except SRWW 02 and SRWW 07) and cadmium in one sample (02WW 02)

The following VOCs were detected in one or more of the ten samples collected at concentrations above the screening levels

- chloroethane in three samples (02WW 01 SRWW 02 and SRWW 04)
- 1 2 DCA in two samples (02WW 02 and SRWW 02)
- 1 1 1 TCA in one sample (02WW 02)
- 1 4 dichlorobenzene in one sample (SRWW 04)
- carbon tetrachloride (CT) in one sample (SRWW 06)
- methylene chloride in one sample (02WW 02)
- TCE in one sample (SRWW 11) and
- VC in one sample (02WW 02)

Benzidine and cadmium had isolated detections above the screening levels in the sewer system wastewater samples Other contaminants detected above the screening levels in the sewer wastewater appear to be Site wide within the sewer system

Field ID	Analyte	Result	Screening Level	Units
PCBs				
02WW 01 0802	PCB 1248	4 3	0 034	UG/L
	Total PCB	4 3	0 034	UG/L
02WW 02 0802	PCB 1248	0 21	0 034	UG/L
	Total PCB	0 21	0 034	UG/L
SRWW 01 0802	PCB 1248	0 13	0 034	UG/L
	Total PCB	0 13	0 034	UG/L
SRWW 02 0802	PCB 1248	0 47	0 034	UG/L
	Total PCB	0 47	0 034	UG/L
SRWW 03-0802	PCB 1248	0 69	0 034	UG/L
	Total PCB	0 69	0 034	UG/L
SRWW 04 0802	PCB-1248	6 8	0 034	UG/L
	Total PCB	6 8	0 034	UG/L
SRWW 06-0802	PCB-1248	2	0 034	UG/L
	Total PCB	2	0 034	UG/L
SRWW 07 0802	PCB-1248	1 4	0 034	UG/L
	Total PCB	1 4	0 034	UG/L
SRWW 10-0802	PCB 1248	0 23	0 034	UG/L
	Total PCB	0 23	0 034	UG/L
SRWW 11 0802	PCB 1248	0 22	0 034	UG/L
	Total PCB	0 22	0 034	UG/L
Semivolatiles				
SRWW 01 0802	Benzo(a)anthracene	0 64	0 0044	UG/L
	Benzo(a)pyrene	1 1	0 0092	UG/L
	Benzo(b)fluoranthene	2	0 0044	UG/L
	Benzo(k)fluoranthene	0 93	0 0044	UG/L
	Chrysene	1 5	0 0044	UG/L
	Dibenz(a h)anthracene	0 21	0 0044	UG/L
	Indeno(1 2 3-cd)pyrene	1	0 0044	UG/L
SRWW 02 0802	Benzo(a)anthracene	0 11	0 0044	UG/L
	Benzo(a)pyrene	0 13	0 0092	UG/L
	Benzo(b)fluoranthene	0 32	0 0044	UG/L
	Benzo(k)fluoranthene	0 14	0 0044	UG/L
	Chrysene	0 21	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	0 08	0 0044	UG/L

Field ID	Analyte	Result	Screening Level	Units
Semivolatiles (Cont)				
SRWW 03-0802	Benzo(a)anthracene	2 8	0 0044	UG/L
	Benzo(a)pyrene	2 7	0 0092	UG/L
	Benzo(b)fluoranthene	3 3	0 0044	UG/L
	Benzo(k)fluoranthene	1 8	0 0044	UG/L
	Chrysene	3 3	0 0044	UG/L
	Dibenz(a h)anthracene	0 56	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	2 6	0 0044	UG/L
SRWW 04 0802	Benzo(a)anthracene	9 7	0 0044	UG/L
	Benzo(a)pyrene	9 2	0 0092	UG/L
	Benzo(b)fluoranthene	12	0 0044	UG/L
	Benzo(k)fluoranthene	5 8	0 0044	UG/L
	Chrysene	13	0 0044	UG/L
	Dibenz(a h)anthracene	1 8	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	8 8	0 0044	UG/L
SRWW 06 0802	Benzo(a)anthracene	0 15	0 0044	UG/L
	Benzo(a)pyrene	0 19	0 0092	UG/L
	Benzo(b)fluoranthene	0 32	0 0044	UG/L
	Benzo(k)fluoranthene	0 2	0 0044	UG/L
	Chrysene	0 23	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	0 14	0 0044	UG/L
SRWW 10 0802	Benzidine	2 3	0 00012	UG/L
	Benzo(a)anthracene	1 8	0 0044	UG/L
	Benzo(a)pyrene	2 4	0 0092	UG/L
	Benzo(b)fluoranthene	2 6	0 0044	UG/L
	Benzo(k)fluoranthene	2 5	0 0044	UG/L
	Chrysene	2 4	0 0044	UG/L
	Dibenz(a h)anthracene	0 33	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	1 8	0 0044	UG/L
SRWW 11 0802	Benzo(a)anthracene	0 079	0 0044	UG/L
	Benzo(b)fluoranthene	0 11	0 0044	UG/L
	Benzo(k)fluoranthene	0 092	0 0044	UG/L
	Chrysene	0 079	0 0044	UG/L
Metals				
02WW 01 0802	Arsenic	2 3	0 045	UG/L
	Lead	412	15	UG/L

Field ID	Analyte	Result	Screening Level	Units
Metals (Cont)				
02WW 02 0802	Arsenic	3 2	0 045	UG/L
	Cadmium	19	5	UG/L
	Lead	70	15	UG/L
SRWW 01 0802	Arsenic	1 3	0 045	UG/L
	Lead	68	15	UG/L
SRWW 02 0802	Arsenic	1 5	0 045	UG/L
SRWW 03 0802	Arsenic	1 8	0 045	UG/L
	Lead	198	15	UG/L
SRWW 04 0802	Arsenic	1 4	0 045	UG/L
	Lead	32	15	UG/L
SRWW 06 0802	Arsenic	1 5	0 045	UG/L
	Lead	20	15	UG/L
SRWW 07 0802	Arsenic	0 9 J	0 045	UG/L
SRWW 10 0802	Arsenic	1 8	0 045	UG/L
	Lead	36	15	UG/L
SRWW 11 0802	Arsenic	1 2	0 045	UG/L
	Lead	15	15	UG/L
Volatiles				
02WW 01 0802	Chloroethane	43	4 6	UG/L
02WW 02 0802	1 1 1 Trichloroethane	340	200	UG/L
	1 2 Dichloroethane	1 2	0 12	UG/L
	Methylene chloride	49	4 3	UG/L
	Vinyl chloride	0 5 J	0 02	UG/L
SRWW 02 0802	1 2 Dichloroethane	0 4 J	0 12	UG/L
	Chloroethane	150	4 6	UG/L
SRWW 04 0802	1 4 Dichlorobenzene	1 2	0 5	UG/L
	Chloroethane	38	4 6	UG/L
SRWW 06-0802	Carbon tetrachloride	2 1	0 17	UG/L
SRWW 11 0802	Trichloroethene	10	0 028	UG/L

* Value calculated by URS

4 12 3 Soil

PCB 1248 and PCB 1254 were each detected in one of the 112 samples but at concentrations below the screening level

A total of seven PAH compounds were detected in two of the 112 samples at concentrations above the respective screening levels These samples were collected from the 3 to 4 feet bgs

interval from boring location SRSB 30 along the western boundary of the property and the 10 to 11 feet bgs interval from boring location SRSB 39 along the railroad line east of Building 1

Arsenic was detected in one of the 112 samples collected at a concentration above the screening level This sample was collected from the 24 to 25 feet bgs interval from boring location SRSB 35 north of Building 2

Beryllium was detected in twenty of the 112 samples collected at concentrations above the screening level These samples were collected between 11 and 26 feet bgs from boring locations throughout the Site Beryllium was detected in all 583 Site wide soil samples analyzed for metals and forty of these results were above the screening level which was based on the background beryllium concentration Based on these findings beryllium is considered to be present throughout the Site possibly due to naturally occurring metals in the native clays and therefore the extent is Site wide

Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of additional contamination in these areas Sample locations which have not been defined vertically may also require additional study and have been marked in the table below with a ** after the Field ID to indicate the deepest sample at the given location

Field ID	Analyte	Result	Screening Level	Units
Semivolatiles				
SRSB 30(03-04) 0802	Benzo(a)anthracene	2 6	0 887	MG/KG
	Benzo(a)pyrene	2 1	0 735	MG/KG
	Benzo(b)fluoranthene	2 5	0 626	MG/KG
	Benzo(g h i)perylene	1 4	0 478	MG/KG
	Dibenz(a h)anthracene	0 36	0 303	MG/KG
	Indeno(1 2 3 cd)pyrene	1 4	0 62	MG/KG
	Phenanthrene	4 7	1 04	MG/KG
SRSB-39(10 11) 0503	Phenanthrene	2100	1040	UG/KG
Metals				
SRSB-02(11 12) 0802	Beryllium	1 4	1 01	MG/KG
SRSB 02(16 17) 0802**	Beryllium	1 3	1 01	MG/KG
SRSB 03(12 13) 0802	Beryllium	1 4	1 01	MG/KG
SRSB 03(16 17) 0802	Beryllium	1 3	1 01	MG/KG
SRSB-05(25 26) 0802**	Beryllium	3 6	1 01	MG/KG
SRSB-06(20 21) 0802	Beryllium	1 4	1 01	MG/KG
SRSB 07(25-26) 0802	Beryllium	1 8	1 01	MG/KG
SRSB 09(14 15) 0802	Beryllium	1 4	1 01	MG/KG
SRSB 09(18 19) 0802	Beryllium	3	1 01	MG/KG
SRSB-10(15-16) 0802	Beryllium	1 3	1 01	MG/KG
SRSB 10(17 18) 0802**	Beryllium	1 6	1 01	MG/KG
SRSB-12(25-26) 0802**	Beryllium	1 2	1 01	MG/KG
SRSB 13(19 20) 0802	Beryllium	2 8	1 01	MG/KG

Field ID	Analyte	Result	Screening Level	Units
Metals (cont)				
SRSB 13(23 24) 0802	Beryllium	2	1 01	MG/KG
SRSB 14(25 26) 0802	Beryllium	1 7	1 01	MG/KG
SRSB 20(23 24) 0902	Beryllium	1 5	1 01	MG/KG
SRSB 26(24 25) 0802	Beryllium	2 7	1 01	MG/KG
SRSB 35(24 25) 0503	Arsenic	20 6	13 2	MG/KG
	Beryllium	1 4	1 01	MG/KG
SRSB 41(17 18) 0503	Beryllium	1 9	1 01	MG/KG
SRSB 41(21 22) 0503	Beryllium	1 4	1 01	MG/KG
TPH				
SRSB-16(06 07) 0902	TPH	530	200	MG/KG
SRSB 18(14 15) 0902	TPH	550	200	MG/KG
SRSB 19(14 15) 0902	TPH	600	200	MG/KG

* Value calculated by URS

** Deepest sample from boring

4 13 GROUNDWATER

All samples were collected as part of the initial sampling event unless otherwise noted Sample locations for the Groundwater Investigation Area are shown in **Figure 2 14** Samples with compounds detected at concentrations above the screening level are presented in tabular form following each discussion A statistical summary of all compounds detected in the Groundwater Investigation Area is presented in **Table 4-19** All analytical data collected from samples in the Groundwater Investigation Area are presented in **Appendix C Tables C-8**

4 13 1 Water Levels

Table 4-18 presents the results of the water level measurements ground surface elevation top of casing elevations and the calculated groundwater elevations

4 13 2 Analytical Results

1 2 Diphenylhydrazine was detected in one of the thirteen samples 08MW 01 north of Building 2 at a concentration above the screening level This compound appears to be isolated within the groundwater on Site north of Building 2 A total of seven PAH compounds were detected in all thirteen samples at concentrations above the respective screening levels The extent of PAHs in the groundwater is Site wide

Of the thirteen samples collected the following metals were detected in one or more of the samples at concentrations above the screening levels arsenic in all thirteen samples and lead in one sample from SWMW 07 in the northwest portion of the Northeast Parking Area The extent of arsenic in the groundwater is Site wide Lead appears to be isolated within the groundwater on Site east of Building 8

The following four VOCs were detected in one well 02MW 01 south of Building 2 of the thirteen sampled at concentrations above the screening levels 1 1 DCE 1 2 DCA CT and chloroform (CF) Since the groundwater flow on Site in generally to the north on this portion of the Site the extent of VOC contamination is defined by adjacent wells SWMW 01 03MW 01 08MW 01 08MW 02 and 08MW 03

Field ID	Analyte	Result	Screening Level	Units
	Semivolatiles			
02MW 01 0902	Benzo(a)pyrene	0 022	0 0092	UG/L
	Benzo(b)fluoranthene	0 024	0 0044	UG/L
	Benzo(k)fluoranthene	0 071	0 0044	UG/L
	Chrysene	0 027	0 0044	UG/L
03MW 01 0902	Benzo(a)anthracene	0 0069	0 0044	UG/L
	Benzo(a)pyrene	0 012	0 0092	UG/L
	Benzo(b)fluoranthene	0 016	0 0044	UG/L
	Benzo(k)fluoranthene	0 008	0 0044	UG/L
	Chrysene	0 017	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	0 015	0 0044	UG/L
08MW 01 0902	1 2 Diphenylhydrazine	0 35 J	0 084	UG/L
	Benzo(a)anthracene	0 005	0 0044	UG/L
	Benzo(a)pyrene	0 011	0 0092	UG/L
	Benzo(b)fluoranthene	0 016	0 0044	UG/L
	Benzo(k)fluoranthene	0 0063	0 0044	UG/L
	Chrysene	0 013	0 0044	UG/L
	Indeno(1 2 3-cd)pyrene	0 011	0 0044	UG/L
08MW 02 0902	Benzo(a)anthracene	0 066	0 0044	UG/L
	Benzo(a)pyrene	0 092	0 0092	UG/L
	Benzo(b)fluoranthene	0 099	0 0044	UG/L
	Benzo(k)fluoranthene	0 19	0 0044	UG/L
	Chrysene	0 13	0 0044	UG/L
	Dibenz(a h)anthracene	0 077	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	0 11	0 0044	UG/L

Field ID	Analyte	Result	Screening Level	Units
	Semivolatiles (Cont)			
08MW 03-0902	Benzo(a)anthracene	0 0049	0 0044	UG/L
	Benzo(a)pyrene	0 01	0 0092	UG/L
	Benzo(b)fluoranthene	0 011	0 0044	UG/L
	Benzo(k)fluoranthene	0 0055	0 0044	UG/L
	Chrysene	0 011	0 0044	UG/L
10MW 01 0902	Benzo(a)anthracene	0 0045	0 0044	UG/L
	Benzo(b)fluoranthene	0 0075	0 0044	UG/L
	Benzo(k)fluoranthene	0 0044	0 0044	UG/L
	Chrysene	0 0086	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	0 0066	0 0044	UG/L
SWMW 01 0902	Benzo(a)anthracene	0 015	0 0044	UG/L
	Benzo(a)pyrene	0 014	0 0092	UG/L
	Benzo(b)fluoranthene	0 014	0 0044	UG/L
	Benzo(k)fluoranthene	0 0074	0 0044	UG/L
	Chrysene	0 018	0 0044	UG/L
SWMW 02 0902	Benzo(a)anthracene	0 04	0 0044	UG/L
	Benzo(a)pyrene	0 045	0 0092	UG/L
	Benzo(b)fluoranthene	0 036	0 0044	UG/L
	Benzo(k)fluoranthene	0 029	0 0044	UG/L
	Chrysene	0 044	0 0044	UG/L
	Dibenz(a h)anthracene	0 013	0 0044	UG/L
SWMW 03 0902	Benzo(b)fluoranthene	0 0054	0 0044	UG/L
	Chrysene	0 0061	0 0044	UG/L
SWMW 04 0902	Benzo(a)anthracene	0 0093	0 0044	UG/L
	Benzo(a)pyrene	0 012	0 0092	UG/L
	Benzo(b)fluoranthene	0 014	0 0044	UG/L
	Benzo(k)fluoranthene	0 0066	0 0044	UG/L
	Chrysene	0 014	0 0044	UG/L
SWMW 05-0902	Benzo(a)anthracene	0 019	0 0044	UG/L
	Benzo(a)pyrene	0 03	0 0092	UG/L
	Benzo(b)fluoranthene	0 03	0 0044	UG/L
	Benzo(k)fluoranthene	0 017	0 0044	UG/L
	Chrysene	0 034	0 0044	UG/L
	Dibenz(a h)anthracene	0 011	0 0044	UG/L
	Indeno(1 2 3 cd)pyrene	0 027	0 0044	UG/L

Field ID	Analyte	Result	Screening Level	Units
Semivolatiles (Cont)				
SWMW 06 0902	Benzo(a)anthracene	0 0044	0 0044	UG/L
	Benzo(a)pyrene	0 026	0 0092	UG/L
	Benzo(b)fluoranthene	0 03	0 0044	UG/L
	Benzo(k)fluoranthene	0 016	0 0044	UG/L
	Dibenz(a h)anthracene	0 0047	0 0044	UG/L
SWMW 07 0902	Dibenz(a h)anthracene	0 0067	0 0044	UG/L
Metals				
02MW 01 0902	Arsenic	1 2	0 045	UG/L
03MW 01 0902	Arsenic	0 7 J	0 045	UG/L
08MW 01 0902	Arsenic	7 8	0 045	UG/L
08MW 02 0902	Arsenic	3 9	0 045	UG/L
08MW 03-0902	Arsenic	1 1	0 045	UG/L
10MW 01 0902	Arsenic	0 8 J	0 045	UG/L
SWMW 01 0902	Arsenic	1 5	0 045	UG/L
SWMW 02 0902	Arsenic	2 5	0 045	UG/L
SWMW 03 0902	Arsenic	1 4	0 045	UG/L
SWMW 04 0902	Arsenic	1 J	0 045	UG/L
SWMW 05 0902	Arsenic	1 J	0 045	UG/L
SWMW 06 0902	Arsenic	0 3 J	0 045	UG/L
SWMW 07 0902	Arsenic	5 1	0 045	UG/L
	Lead	44	15	UG/L
Volatiles				
02MW 01 0902	1 1 Dichloroethene	34	7	UG/L
	1 2 Dichloroethane	0 4	0 12	UG/L
	Carbon tetrachloride	1	0 17	UG/L
	Chloroform	10	6 2	UG/L

4 14 DATA QUALITY REVIEW

Data reported by the analytical laboratories are reviewed to ensure that the data are of sufficient quality to be useable for decision making purposes Items included in the data review include the analytical procedures used by the laboratory as well as a variety of Quality Control (QC) samples and procedures used to ensure the quality of the data Results that failed one or more QC criteria may be qualified with one of the following data qualifiers

R Rejected data are unusable

J Estimated data are usable but the reported result is an estimate

UJ Non detect but the reported quantitation limit is an estimate

For samples with multiple reportable results often due to dilution or reanalysis of the sample results that were not selected for use in decision making were flagged with an **R** so that each sample has only one reportable result for each analyte The only exception to this selection process is the dioxin data for which no single result was deemed more useable than another The TEQ for these dioxin samples with multiple results utilized the highest reportable result for each analyte as the basis for the TEQ calculation The data qualified as **UJ** or **J** are used for decision making purposes and are included in the analytical results tables in Appendix C with their **UJ** or **J** data qualifiers

Most of the data collected for the SSEBS met the quality data objectives and have been accepted for their intended use Sufficient (initial analysis or reanalysis) data of acceptable quality exists for each sampling location for every parameter analyzed The data required some qualification and some rejection as described in this Section however the completeness goals for usable and quality data for the project were met The overall project Completeness goals for Usable and Quality Data (95% and 80% respectively) were achieved and are presented in the following table

Parameter	% Usable Data	% Quality Data
Dioxins/Furans	100	60 7
DRO	95 5	75 4
Explosives	100	100
GRO	100	76 5
Metals	99 7	77 1
PCBs	99 5	96 4
Pesticides	100	87 8
SVOCs	99 0	70 2
VOCs	99 6	85 7
Project Total (All Parameters)	99 4	81 1

For the purpose of calculating the values in this table Usable Data were defined as any data points that did not require rejection (**R**) Quality Data were defined as those data points that did not require any qualification other than the non detect (**U**) qualifiers supplied by the laboratory Data points qualified as non detect (**U**) by URS often due to contamination in the associated blank sample and those qualified with an **R, J** or **UJ** were excluded from the Quality Data classification Qualifiers such as **J** and **UJ** are considered Usable Data but not Quality Data since the values given often include some uncertainties introduced by the failure of one or more QC criteria Furthermore many **J** qualifiers represent a low confidence in data values that are detected below the statistically derived quantitation limit

This contaminant fate and transport analysis uses an environmental screening assessment process which is based on guidance outlined by the EPA (EPA 1998b) Information presented in earlier sections of this report concerning Site physical characteristics and the nature and extent of contamination will be used for this fate and transport analysis

The fate and transport analysis begins with the screening of potential routes of contaminant migration The screening process as outlined by the EPA (EPA 1998b) provides a consistent basis for fate and transport analysis The fate and transport analysis continues with a discussion of the persistence of selected chemical classes identified in samples collected at the Site Contaminant persistence consists of two main components chemical degradation and contaminant mobility These two components are discussed for dioxins metals PCBs pesticides SVOCs TPH DRO and VOCs found in samples from the Site at concentrations above the screening levels

5 1 SCREENING OF POTENTIAL ROUTES OF CONTAMINATION MIGRATION

This section discusses the potential routes for contaminant migration within and from the Site Site specific characteristics will also be used to evaluate the likelihood of actual contaminant movement through each route

5 1 1 Erosion

Contaminants that sorb to soil particles can still move through the environment via water and air erosion of the soil particles These forms of contaminant migration can be significant in locations where contaminated soils are exposed to these weathering conditions However most of the SLAAP property is covered with structures paving materials or vegetation As long as these conditions persist contamination migration through erosion and fugitive dust should be negligible Any hazards posed by removing cover materials or by excavation are easily managed

5 1 2 Groundwater

Migration of contamination dissolved in the groundwater can be through groundwater flow or dispersion Contaminants may travel at the same speed as the groundwater flow or may be retarded as the compound binds to soil particles and releases back into the water column Contaminants may also move out of the water column by remaining sorbed to soil particles or volatilizing and moving into the unsaturated pore spaces of the soil

5 1 3 Sewer System

Four potential routes of migration exist for the contaminants in the sewer system

- Contaminants dissolved in the wastewater can flow through the system with the runoff from each storm event
- Contaminants sorbed to sediment particles can be washed downstream with the stormwater runoff

- Any of these contaminants can move through breaches in the pipe wall to spread into the soil and/or groundwater
- Compounds found in the sediment and wastewater may volatilize over time and either remain suspended in the air within the sewer or eventually migrate toward a stormwater inlet and escape to the atmosphere or be re entrained in the sediments or wastewater

Soil borings SRSB 1 through SRSB 34 were located along the sewer lines during the initial sampling event to assess the overall potential for contaminant releases Soil borings SRSB 35 through SRSB 44 were located during the CSP to assess specific potential contaminant releases from the pipe breaches identified during the sewer survey Arsenic PAHs and TPH DRO are the only contaminants common to the sewer sediments or wastewater and the soil borings adjacent to the sewer lines However arsenic was the only compound detected above the screening levels in the sewer sediment or wastewater samples and in a soil sample near the breach close to the sediment or wastewater detection(s) Arsenic was detected above the screening level in all ten wastewater samples four of the six sediment samples all but one of the 584 soil samples and all thirteen groundwater samples collected on the Site as well as all ten of the regional background soil samples Since these results indicate that arsenic is more of a Site wide and background constituent the sewer breaches do not appear to be allowing measurable amounts of contamination from the sewer sediment and wastewater to exit the sewer system into the Site soil and groundwater Therefore the stormwater flow to the treatment facility is the only route of migration for the contamination found in the sewer sediments and wastewater

Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of localized contamination in and directly beneath, the sewer system and sewer trenches

5 1 4 Soils

Contaminants can migrate through soil by dissolving in a more mobile liquid media (i e oil or water) as it travels through the soil matrix or by cation exchange within the soil matrix The mobility of organic compounds in the soil is determined mostly by the compound s propensity to bind or sorb to soil particles and to dissolve in water or another solvent Inorganics specifically metals tend to depend more on cation exchange and valence state for mobility in the subsurface soils Compounds with high octanol/water partition coefficients (K_{ow}) are more soluble in oil based solvents than water A compound s ability to migrate or react with other compounds or organisms in the subsurface environment is determined by its availability Compounds that are sorbed to soil particles are relatively unavailable for transport or transformation via chemical or biological reactions The sorption coefficient (K_{oc}) defines each compounds preference for binding to soil particles Higher values for K_{oc} have a higher preference for occupying limited binding sites within the soil matrix and therefore will exhibit less mobility and transformation in the subsurface environment

5 1 5 Soil Gases

Volatile compounds in both the soil and groundwater can have a significant presence in the vapor phase in the void spaces of the soil Vapors can then migrate both laterally and vertically

toward the surface Since the majority of the surface at the Site is capped with structures concrete or asphalt these vapors would have limited means of migration to the atmosphere

5 1 6 Precipitation Runoff

Precipitation runoff can transport contaminants from locations of initial deposition Materials that were deposited on rooftops may wash off during precipitation events On the Site all buildings have either a flat roof with roof drains connected directly to the sewer system or gutters at the edge of the roof which either connect directly to the sewer system (i e Building 2) or discharge to the concrete roadways Since much of the Site is covered with structures concrete or asphalt pavement precipitation runoff predominantly flows along the roadways and into sewer system inlet structures (see **Section 5 1 3**)

5 2 CONTAMINANT PERSISTENCE

This section discusses the fate of the compounds found on the Site at concentrations above the screening level Characteristics such as water solubility potential for soil adsorption volatility and degradation potential will be presented for each compound or class of compounds Physical and chemical properties for each chemical are summarized in **Table 5-1**

Contaminants found in the sewer system present a unique situation EPA Region IX and MDNR did not establish the screening levels used in this SSEBS for sewer sediment and wastewater samples but rather for soil and tap water (EPA) or groundwater (MDNR) respectively Therefore the detections above the screening levels serve only as an indication that contamination that may be present and could result in releases from the sewers Also contaminant migration from the sewer system is limited to downstream flow to the treatment facility (see **Section 5 1 3**) Therefore the following contaminants detected above the screening levels only in sewer sediment and/or wastewater samples are not considered to be a concern to the soil or groundwater on Site and require no further discussion of persistence

- cadmium
- chromium
- PCB 1260 (although PCBs are discussed in general in **Section 5 2 4**)
- benzidine
- di n octylphthalate
- 1 1 1 trichloroethane
- 1 1 dichloroethane
- 1 4 dichlorobenzene
- chloroethane
- methylene chloride
- trichloroethene and
- vinyl chloride

5 2 1 Dioxins

Dioxins were detected in soil samples from the Site at concentrations above the screening level Dioxins are a wide class of compounds that are generally found as contaminants in other chemical production or as combustion by products 2 3 7 8 tetrachlorodibenzo p dioxin (2 3 7 8 TCDD) is the most toxic to mammals and is the most researched of the seventy five compounds 2 3 7 8 TCDD will be used here for the basis of discussion for all of the dioxins found on the Site

Dioxins are insoluble in water and strongly sorb to soil particles and organic matter They are however soluble in oils and fats and can therefore migrate through the environment and bioaccumulate in the fatty tissue of animals with prolonged exposure Dioxins are resistant to most chemical and biochemical transformation processes Transport mechanisms for dioxins in the environment are therefore mostly limited to erosion and dissolution within petroleum spills (Oak Ridge 1989)

5 2 2 Metals

Metals vary greatly in their physical and chemical properties and therefore are discussed separately Metals are also unique as environmental contaminants in that they are naturally occurring at levels considered normal or background Also metals generally exist in the environment as salts The anion (chloride, sulfate, carbonate, etc) of these salts can have as much influence on the physical and chemical properties as the metal cation Analytical procedures do not determine the exact anion species present in a given sample Therefore certain generalizations are made concerning the fate and transport of metals on the Site

Antimony

Antimony was detected at concentrations above the screening levels in sediment and soil samples on the Site Antimony can assume a variety of different oxidation states but the most common are +5 +3 and 3 In the environment it is most commonly found as antimony sulfide but may also exist in its elemental form or as an oxide or antimonide (CRC 1995) It can be found at low levels in natural waters, but is considered to be insoluble in water and sorbs strongly to soils with iron manganese or aluminum Antimony can also become airborne when attached to small particles and may remain in the air for many days (ATSDR 1992)

Arsenic

Arsenic was detected at concentrations above the screening levels in samples from the groundwater sediment soil and wastewater on Site Arsenic in the environment is typically combined with other elements in one of two forms Those two forms are organic arsenic which is a combination with carbon and hydrogen and inorganic arsenic which is a combination with other elements such as oxygen, chlorine or sulfur Oxidation states of +3 and +5 are the most common with +5 being more common in water since it is more thermodynamically stable Arsenic is considered insoluble in water but in soil it becomes more mobile and moves to groundwater more readily at higher pH values Such mobility at a higher pH is unlike other metals and liming of soil to immobilize other metals has been observed to inadvertently mobilize arsenic In soil arsenic exists primarily in inorganic forms but methylated arsenical

can be found as well Biological activity and leaching both affect the fate of arsenic in soil The amount of leaching in soil is dictated by the solubility and clayey soils such as those found at the Site tend to bind arsenic with their charged surfaces and therefore reduce its solubility (Irwin 1998)

Beryllium

Beryllium was detected above the screening level in the soils on Site Beryllium is found naturally in a wide variety of forms including oxides hydroxides and salts In soil beryllium sorbs tightly to soil particles by displacing divalent cations that share common sorption sites For clay soils such as those found at the Site beryllium will be absorbed at low pHs and will precipitate as insoluble complexes at higher pH values Beryllium may form soluble polynuclear hydroxide complexes at a high pH but it is generally considered to be insoluble in natural waters and therefore immobile in soil Beryllium s low solubility and the tendency of soluble beryllium salts to speciate into insoluble beryllium hydroxides mean that beryllium is rarely observed at significant concentrations in natural waters (Irwin 1998)

Copper

Copper was detected on Site at concentrations above the screening level in sediment and soil samples Copper can assume oxidation states of +1 +2 or +3 but +2 is the most common form It is found in the environment in its elemental form as well as in sulfides arsenites chlorides and carbonates Its mobility in soil is influenced significantly by pH with copper being much more mobile in acidic environments than in alkaline ones Copper is an essential nutrient for many plants and animals so uptake by plants is common in soil Low growing grasses such as those found at the Site typically have the highest concentrations of copper while tree foliage has the lowest Copper is generally considered insoluble in water but at a low pH elemental copper is the dominant species while at a higher pH other complexes will dominate (Snoeyink 1980) Of particular concern in the environment is copper sulfides which are highly insoluble and often found in sediments (Irwin 1998)

Lead

Lead was detected at concentrations above the screening levels in groundwater sediment soil and wastewater samples on Site Lead is stable in its elemental form but can form a wide variety of salts and compounds with other elements It is considered relatively insoluble in water but is slightly more soluble at low pHs In the environment lead will gradually speciate to highly insoluble salts and lead also sorbs strongly to clays and organic matter by forming complexes with these materials Leaching to groundwater is therefore not a significant pathway for lead due to its low solubility characteristics Uptake of lead by plants has been observed, but phytoremediation experiments have determined that it is often confined to the root system Distribution of lead through the atmosphere is caused mostly by human activities The addition of tetraethyl and tetramethyl lead to gasoline is one such source of atmospheric lead and elevated levels of lead in soil are common near major highways such as Interstate 70 which is immediately adjacent to the Site (Irwin 1998)

Mercury

Mercury was detected at concentrations above the screening level in Site sediment and soil samples Mercury exists naturally in many different forms including elemental mercury and various mercury compounds The compounds may include elements such as chlorine carbon or oxygen and are considered organic if they contain carbon and inorganic if they do not In the environment volatilization is a significant transport mechanism for mercury Mercury in soil is often volatilized and redeposited elsewhere a process that may recur every day or two in areas significantly heated by sunlight In water biotransformation is also a significant fate of mercury Of particular concern is the production of methyl mercury since it is extremely toxic and tends to bioaccumulate in fish Mercury is considered to be slightly soluble in water but it also sorbs strongly to soil particles and moves most readily through natural waters when it is attached to particles (Irwin 1998)

5 2 3 Pesticides

Two pesticides 4 4 DDE and 4 4 DDT were detected in the soils above the screening levels Since 4 4 DDE is the primary degradation product of 4 4 DDT they have similar properties and will be discussed together

Both compounds are classified as halogenated organics and are highly persistent in the environment Due to high K_{oc} and K_{ow} values and a very low Henry s constant, both compounds are relatively non volatile and immobile sorbing strongly to soil particles especially organic matter in surface soils Photolysis can play a major role in degrading these compounds from aqueous or shallow soil environments but biodegradation though very slow is expected to be the main pathway in most soil environments (Oak Ridge 1989)

5 2 4 Polychlorinated Biphenyls

Three different mixtures of PCBs PCB 1248 PCB 1254 and PCB 1260 were detected on Site at concentrations above the screening level in concrete sediment soil and wastewater samples PCBs are different from other contaminants in that the name assigned to a contaminant represents of mixture of chlorinated biphenyl compounds with the last two digits of the label representing the percent chlorine by weight in the mixture Thus PCB 1254 is actually a mixture of six or more compounds with an average weight percent of chlorine of 54% Therefore since all PCBs are mixtures of similar compounds with varying physical and chemical properties based on the degree of chlorination they will all be discussed together

The primary fate of PCBs in the environment is to sorb strongly to soils Smaller fractions may dissolve in groundwater or remain dissolved in organic solvents if the contamination is the result of a spill of sufficient quantity Volatilization from any source is expected to be insignificant Photolytic and biochemical transformations may play a small role in reducing concentrations of PCBs in the environment but rates are expected to be quite slow Transport through the soil will primarily follow very porous layers or fractured soil layers with lower chlorinated compounds sorbing less and therefore migrating greater distances than the more heavily chlorinated compounds (Oak Ridge 1989)

5 2 5 Semi Volatile Organic Compounds

PAHs were found at concentrations above the screening levels in the groundwater sediment soils and wastewater on the Site Since the compounds detected above the screening level have similar properties one general discussion is presented One other SVOC 1 2 diphenylhydrazine was also detected above the screening level once in the groundwater on the Site and is also discussed

Polynuclear Aromatic Hydrocarbons

PAHs are most commonly found to be strongly sorbed to soil particles or organic matter in the environment The smaller (2 and 3 ring) compounds may dissolve into groundwater more easily than the heavier (4 5 and 6 ring) compounds yet are still predominantly insoluble Transformation of these compounds in the environment by photolysis or biochemical reaction is extremely slow therefore they are expected to persist in soils for long periods of time (Irwin 1998)

1,2 Diphenylhydrazine

1 2 Diphenylhydrazine was detected in the groundwater on the Site It has a low volatility and will moderately attach to soil particles but will dissolve slowly into any existing groundwater Due to the chemical structure of 1 2 diphenylhydrazine it is expected to be rapidly broken down through hydrolysis and biochemical reactions into compounds such as benzidine and azobenzene (ATSDR 1999)

5 2 6 Total Petroleum Hydrocarbons – Diesel Range Organics

TPH DRO was detected on the Site at concentrations above the screening levels in concrete sediment and soil samples TPH DRO is an analytical method for determining concentrations of a wide range of petroleum hydrocarbons from diesel fuel to mineral oils to jet fuel to fuel oils Each of these petroleum compounds is actually a complex mixture of hydrocarbons having varying molecular weight and structure Therefore detailed properties relevant to the discussion of fate and transport have not been documented General observations and properties of some of the major class components are presented below

Most constituents of petroleum hydrocarbons will sorb to soil particles and organic material in soil to varying degrees This leads to the constituent make up of the mixtures changing over time as more soluble less strongly sorbed compounds are more available for transport in the groundwater and degradation by chemical and microbial action Volatilization from shallow soils percolation through soils dissolution into groundwater and microbial degradation into other products are the major processes effecting TPH DRO fate in the environment (Oak Ridge 1989)

5 2 7 Volatile Organic Compounds

Four VOCs 1 1 DCE 1 2 DCA CT and CF were detected above the screening levels in the groundwater on Site All four compounds are chlorinated methanes ethanes and ethenes giving them similar physical and chemical properties 1 1 DCE and 1 2 DCA are transformation

products of 1 1 1 TCA and TCE CF is the first step in the breakdown of CT to carbon dioxide water and chloride ions All four compounds have relatively low sorption coefficients and therefore will readily partition to the aqueous phase from the soil All four compounds also are volatile and will migrate to the soil gas or atmosphere given sufficient water air interface area Transformation rates in soil water and air are relatively slow greater than one month half lives for all four chemicals (Irwin 1998)

5 3 CONCLUSIONS

The environmental screening process provided the basis for the following conclusions regarding the contaminant fate and transport at the Site

- The PCBs and TPH DRO found in the concrete on the Site are fixed and should not pose any concern unless the concrete is broken up or removed
- The dioxins PAHs PCBs and pesticides found in the soils should be mostly sorbed to the soil particles These compounds are not readily soluble in water and therefore are not expected to migrate into the groundwater except where they are co located with organic solvents such as oils (TPH) since these contaminants can dissolve into these solvents and become more mobile in the subsurface soils
- Arsenic was detected in all but one of the 584 soil samples including two detections above the screening level It was also detected above the screening level in all thirteen groundwater samples These findings indicate more of a natural background condition rather than a Site contaminant therefore arsenic transport is not of environmental concern as it is relatively ubiquitous in the vicinity of the Site
- Beryllium was detected in all 583 soil samples collected at the Site and above the screening level in forty samples collected from the following Investigation Areas Buildings 2 4 6 and 7 Railroads, Roadways and Sewer System As with the arsenic these findings indicate more of a natural background condition rather than a Site contaminant therefore beryllium transport is not of environmental concern as it is relatively ubiquitous in the vicinity of the Site
- Mercury is more mobile than other species of metals due to its liquid state and ambient temperature However the localized area of the contamination under Building 6 minimizes the potential for groundwater movement and other transport of the mercury
- The other metals found in the soils (antimony copper and lead) can be assumed to be mostly sorbed to the soil particles based on the characteristics discussed above and should not pose a concern unless disturbed
- TPH DRO in the soils in the Investigation Areas for Buildings 2 8 and 10 may continue to migrate through the soils via gravity and localized perched groundwater movement The effects of dispersion and microorganisms may assist in reducing the concentrations available for transport

- The contaminants found in the sewer system sediments and wastewater do not appear to have an immediate means of transport to impact the soils and groundwater on the Site These contaminants may continue to dilute and mobilize downstream in the sewer system during precipitation events or if operations generating wastewater are reconnected to the sewer system
- PAHs found in the groundwater are most likely sorbed to soil particles in the wells due to the high sorption coefficient and low solubility of these compounds and therefore are not likely to be mobile in the groundwater
- 1 2 Diphenylhydrazine in the groundwater is currently localized in one well (08MW 01) directly north of Building 2
- The four VOCs in the groundwater are currently localized in one well (02MW 01) directly south of Building 2 but may spread or disperse with groundwater movement

In conjunction with **Table 1 12** which presents a summary of the findings and recommendations from the Comprehensive EBS this section summarizes the nature and extent of contamination and presents conclusions regarding the contamination at the Site For items in **Table 1-12** where no additional investigations were performed under this SSEBS the original findings from the Comprehensive EBS stand and the results are not repeated in this Section For SSEBS investigations the additional data collected and analyzed in this SSEBS supercedes the findings and recommendations of the Comprehensive EBS

6 1 SUMMARY OF NATURE AND EXTENT OF CONTAMINATION

This section presents a brief summary of the findings of the nature and extent of contamination for all media at the Site

6 1 1 Building Materials and Product Samples

The following discussions summarize the results from building materials and products that were sampled and analyzed during the SSEBS investigation Screening levels referenced in this section can be found in **Table 4-4**

- **Asbestos** None of the furnace foundation refractory bricks in Building 2 had asbestos results above the screening level
- **Concrete**

  PCBs were detected in 76% of the concrete samples collected however only one sample in the northwest corner of Building 2 had a concentration above the screening level

  TPH DRO was detected at a concentration over ten times the soil screening level in Building 7 from the only sample analyzed for TPH
- **Mastic** The mastic beneath the flooring in Buildings 5 and 6 has detectable concentrations of PCBs however the concentrations were below the screening level
- **Wipe Samples (Duct)** The wipe sample collected from the HVAC ductwork in Building 6 had detections of twelve metals sixteen SVOCs and four VOCs
- **Product Samples** PCBs were detected in one of the two product samples collected in Building 2 but at a concentration below the screening level

6 1 2 Sewer System

Contaminants found in the sewer system present a unique situation EPA Region IX and MDNR did not establish the screening levels used in this SSEBS for sewer sediment and wastewater samples but rather for soil and tap water (EPA) or groundwater (MDNR) respectively Therefore the detections above the screening levels serve only as an indication that contamination that may be present and could result in releases from the sewers

The following compounds were detected at concentrations above the soil screening levels in the sewer sediments on the Site

- Dioxins in the only sample collected and analyzed for dioxins as part of the CSP
- Antimony in four of the five samples analyzed
- Arsenic in three of the five samples analyzed
- Chromium in three of the five samples analyzed
- Copper in one of the five samples analyzed
- Lead in two of the five samples analyzed
- Mercury in one of the five samples analyzed
- PCBs in all six samples analyzed
- Ten different PAHs in all three samples analyzed (02SD 01 and 02SD 02 were not analyzed for SVOCs)
- One other SVOC (di n octylphthalate) in one sample north of Building 2
- TPH DRO in all five samples analyzed
- Seven different VOCs (1 1 1 TCA 1 1 DCA 1 2 DCA CA methylene chloride TCE VC) in four of the five samples analyzed

The following compounds were detected at concentrations above the water screening levels in the sewer wastewater on the Site

- PCBs in all ten samples analyzed
- Arsenic in all ten samples
- Cadmium in one of the ten analyzed south of Building 2
- Lead in eight of the ten samples
- Seven different PAHs in seven of the eight samples analyzed (02WW 01 and 02WW 02 were not analyzed for SVOCs)
- One other SVOC (benzidine) in one sample northwest of Building 6 of the eight analyzed
- Eight different VOCs (1 1 1 TCA 1 2 DCA 1 4 dichlorobenzene CT CA methylene chloride TCE and VC) in six of the ten samples analyzed

6 1 3 Soil

The following compounds were detected at concentrations above the screening levels in the soils on Site

- Dioxins were only analyzed in samples designated to assess contamination in the Building 2 Investigation Area Dioxins were detected at concentrations above the screening levels in twenty nine samples throughout the soils under Building 2 However none of the thirty samples collected from ten to twenty feet outside the building foundation had dioxin concentrations above the screening level

- PCBs were detected at concentrations above the screening levels in seven samples in the Investigation Areas for Buildings 1 2 and 7
- 4 4 DDE was detected at a concentration above the screening level in one sample in the basement soil under Building 5 and 4 4 DDT was detected at concentrations above the screening level in three samples in the basement soils under Buildings 5 and 6
- Nine different PAHs were detected at concentrations above the screening levels in twenty two of the 533 to 540 samples analyzed (Certain CSP samples were only analyzed for specific PAHs detected above the screening level in the original sample) These compounds were detected in soils from the Investigation Areas for Buildings 1 4 5 7 and 8 the Northeast Parking Area the Roadways and the Sewer System
- The following six metals were detected on the Site at concentrations above the screening levels
  - Antimony was detected once in the Roadways Investigation Area west of Building 1 and south of Building 8
  - Arsenic was detected once each in the Investigation Areas for Building 1 southeast of the building and the Sewer System north of Building 2
  - Beryllium was detected in forty (6 9%) of the 583 soil samples Site wide
  - Copper was detected once in the parking area west of Building 1
  - Lead was detected in the 0 to 0 5 foot bgs sample interval once each in the Investigation Areas for Building 2 (northwest corner of the building) Building 5 (just east of the tunnel entrance to Building 3) and Building 7 (south of the former cooling tower location) and
  - Mercury was detected in four of the samples collected from the north side of the basement in Building 6 Three surface samples on either side of the tunnel connecting to Building 3 and one 2 to 3 foot bgs sample below one of the surface samples
- TPH DRO were detected in seven samples in Building 2 one sample along the pipe trench in the Building 8 Investigation Area and three samples from the Sewer System Investigation Area Two of the three Sewer System samples were from within the Building 10 Investigation Area and the third was along the railroad line northeast of Building 10 and southeast of Building 1

6 1 4 Groundwater

No distinct water bearing units were identified above the shale bedrock on the Site Perched groundwater was present in the silty clay formations and all of the monitoring wells on Site eventually produced sufficient sample volumes for analysis None of the wells produced water with an adequate flow rate to sustain low flow pumping for sampling and all wells were bailed by hand This method yields samples with increasing turbidity with each bailer volume removed from the well Because the water was not filtered some of the contamination summarized below (especially metals and PAHs) may actually be due to compounds sorbed to the suspended matter

The following compounds were detected above the screening levels in the groundwater in a majority of the wells on Site

- Arsenic (all thirteen samples)
- Seven different PAHs (twelve of the thirteen samples)

The following compounds were detected above the screening levels in the groundwater in localized areas on Site

- Lead in one well in the northern portion of the Northeast Parking Area
- One SVOC 1 2 diphenylhydrazine in the one well directly north of Building 2
- Four VOCs (1 1 DCE 1 2 DCA CT and CF) in one well directly south of Building 2

6 2 CONCLUSIONS

This section presents the conclusions from the investigation an assessment of additional data required to characterize any of the Investigation Areas on the Site and a statement of the Investigation Areas that will be addressed in the Baseline HHRA

6 2 1 Building Materials and Product Samples

The following discussions summarize the results from building materials and products that were sampled and analyzed during the SSEBS investigation Screening levels referenced in this section can be found in **Table 4-4**

- **Asbestos** The furnace foundation refractory bricks in Building 2 are not considered ACM and do not require further action
- **Concrete**
  - Because Risks associated with concrete surfaces cannot be readily quantified using standard risk assessment protocols concrete contamination will not be addressed quantitatively in the Baseline HHRA Depending on the future uses of the Site additional studies may be warranted to define the extent of PCB contaminated concrete in Building 2 to either remove or isolate the area of contaminated material
  - The TPH contaminated concrete in Building 7 may require further action once future uses for the Site and this building are established
- **Mastic** Since the concentration of PCBs in the mastic beneath the flooring in Buildings 5 and 6 is below the regulatory guidance no further action is required
- **Wipe Samples (Duct)** – No regulatory guidance was available to establish screening levels for the compounds detected in the sample from the Building 6 HVAC duct system However further investigation and/or remedial actions may be required depending on future uses of the building and Site
- **Product Samples** - The two products found in Building 2 are not defined as PCB containing wastes No further characterization is recommended for the SSEBS

6 2 2 Sewer System

Contaminants found in the sewer system present a unique situation EPA Region IX and MDNR did not establish the screening levels used in this SSEBS for sewer sediment and wastewater samples but rather for soil and tap water (EPA) or groundwater (MDNR) respectively Therefore the detections above the screening levels serve only as an indication that contamination that may be present and could result in releases from the sewers At this time no further characterization data are required Depending on the future uses of the Site additional studies may be warranted to further evaluate the possibility of localized contamination in and directly beneath the sewer system and sewer trenches

6 2 3 Soil

The Baseline HHRA will evaluate the risks associated with each compound detected above the screening levels except TPH DRO results sewer soil samples collected below 11 feet bgs and sewer soil samples that do not initiate a hotspot analysis

Soils with TPH DRO concentrations above the screening level will have to be assessed once the future uses of the Site are determined CALM establishes cleanup target concentrations based on the property usage 200 mg/kg for residential 500 mg/kg for commercial and 1000 mg/kg for industrial

Depending on the future uses of the Site the vertical extent of contamination may also require additional studies in borings where contamination exceeded the Screening Levels in the deepest sample from that boring

6 2 4 Groundwater

No distinct water bearing units were identified above the shale bedrock on the Site Perched groundwater was present in the silty clay formations and all of the monitoring wells on Site eventually produced sufficient sample volumes for analysis However none of the wells produced water with an adequate flow rate to sustain low flow pumping for sampling and all wells had to be bailed by hand This method yields samples with increasing turbidity with each bailer volume removed from the well Because the water was not filtered some of the contamination may actually be due to compounds sorbed to the suspended matter

Based on groundwater surface contours developed from the April 30 and May 8 2003 water level readings the groundwater flow on Site is generally to the north on the western portion of the property and to the northeast on the eastern portion of the property Groundwater flow rates are expected to be low due to the low permeability of silty clay soils as reported in **Section 3 2** These assumptions are supported by the findings that the VOCs in 02MW 01 were not detected in the four new wells installed generally downgradient from 02MW 01 except 1 1 DCA which was detected below the screening level in 08MW 02

A water supply well on the Site would not be feasible due to the low water yield experienced during sampling activities Also the City of St Louis has an ordinance prohibiting the use of private water supply wells within the city water distribution area The perched groundwater on Site will be assessed in the Baseline HHRA for exposure of future construction workers that may come in contact with the water through excavation activities

6 2 5 Investigation Areas Requiring Additional Data

Based on the analysis of the data collected for the SSEBS all data have been collected to characterize the nature and extent of contamination in all of the Investigation Areas in accordance with the FSP to satisfy the SSEBS and Baseline HHRA in support of the FOSET process For each Investigation Area the type location and number of samples collected meets the Data Quality Objectives defined in Section 3 of the FSP Depending on the future uses of the Site and the risk management decisions additional studies may be warranted to further evaluate the possibility of contamination in the following areas

- PCB contaminated concrete in Buildings 1 2 4 & 5
- Localized contamination in and directly beneath the sewer system and sewer trenches
- The vertical extent of contamination in borings where contamination exceeded the Screening Levels in the deepest sample from that boring
- Asbestos and lead based paint contamination throughout the buildings
- Waste characterization prior to waste disposal
- Characterization of potential contamination below the deadman pads for the former Building 10 USTs

6 2 6 Investigation Areas to be Addressed in the Baseline Human Health Risk Assessment

The following Investigation Areas will be addressed in the Baseline HHRA because there was one or more compounds detected above the screening levels in the soil or groundwater

- Building 1
- Building 2
- Building 4
- Building 5
- Building 6
- Building 7
- Building 8
- Northeast Parking Area
- Railroads
- Roadways
- Groundwater

A number of potential hotspots were evaluated as part of the SSEBS Potential hotspots are relatively small areas where known or suspected releases may have occurred Examples include stained soils under machinery locations where the Comprehensive EBS found chemicals present above screening levels or areas where chemicals were reportedly handled but where no data exists These hotspot areas typically cover a small fraction of the area covered by the building or

investigation area with which they are associated For purposes of the risk assessment all soil data collected from the 0 10 foot bgs interval during the SSEBS including those designated as risk assessment samples in the FSP will be included in the hotspot evaluation Hotspots are defined as discrete areas of contamination where one or more chemicals are present at concentrations above screening levels (e g exceedances) A hotspot could consist of one or more samples In the event that adjacent samples showed exceedances they were pooled as a single hotspot Samples with no exceedances were used to identify the boundaries of the hotspots and will not be included in the hotspot dataset when calculating risks A summary of the individual hotspots to be evaluated in the Baseline HHRA is presented in **Table 6-1** and shown on **Figure 6-1**

The Investigation Area for Building 10 will not be addressed in the HHRA because only TPH DRO contamination was identified above the screening levels and there are no established risk characteristics for these compounds The Sewer System Investigation Area will not be addressed in the Baseline HHRA due to the greater depth of the majority of the samples unless isolated detections less than 11 feet bgs are of high enough concentrations to initiate hot spot analyses

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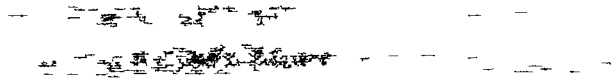

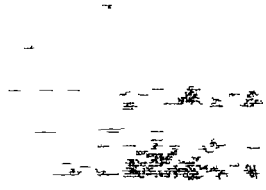

Table 1 1 Summary of Physical Features for Building 1

Building Characteristics	
Building Name	Billet Cutting Building
Area	8 770 square feet (ft^2)
Style	One story
Construction Materials	Steel frame and roof truss building with corrugated asbestos siding The floor is reinforced concrete The roof is precast concrete slab deck with a pitch felt and gravel surface
Construction Date	Built in 1944
Heat Source	High pressure steam (40 lb/sq inch) from the basement of Building 3 was directed to Building 1 via a 4 inch line Steam condensate was pumped back to the basement of Building 3 When the steam supply was not operating unit heaters with fans were used to provide some ventilation and heating
Historical Use	
Occupants/Lessees	1944 to 1983 SLAAP (105 millimeter (mm) Howitzer shell production)
Operational Periods	1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1966 to 1969 105 mm Howitzer shell production
Historical Processes	
Process Summary	Steel billets were stored in concrete and H beam racks outside of the eastern and western sides of Building 1 Long 4 inch square steel billets or bars were fed into the building via conveyor systems to four nicking machines (two on the east and two on the west sides) Each nicking machine consisted of eight oxygen assisted acetylene torches that would create a nick approximately 1/4 deep and 3/16 wide along the width of each bar Following nicking conveyor feeds would move the billets through a direct-contact water cooling process to eight breaking machines (each rated for 530 slugs per hour) Billet ends from each end slug were cut to size in cold saw machines Snag grinding as necessary was completed on all breaks that did not meet specifications Following inspection the finished 8 1/2 slugs were mounted on skids and transported to the forge building (Building 2)
Process Machinery	Process machinery included conveyor tables billet nicking machines conveyer systems equipped with water sprays hydraulic breaking presses cold saws and a saw sharpener snag grinders fume exhaust fans a dust collector self propelled electric cranes unit ventilators pits under hydraulic breaking machines pits with process water discharge and a pit with an acetylene drip pot
Process Utilities	Water steam compressed air acetylene gas oxygen gas and electricity
Hazardous Material Information	
Possible Hazardous Material Used	Acetylene quench water cooling oil hydraulic fluids and machine lubricants
Hazardous Material Storage and Usage Areas	Pits under hydraulic break machines two pit with process water discharge and a pit below the acetylene drip pot
Hazardous Material Off Loading Areas	A loading dock is present along the northern side of the building

Table 1 2 Summary of Physical Features for Building 2

Building Characteristics	
Building Name	Forge Building
Area	First Floor 73 095 ft² Second Floor (Switching Room) 792 ft² Third Floor (Machine Balconies) 2 964 ft² Fourth Floor (Catwalks) 1 803 ft² Fifth Floor (Locker Rooms) 1 701 ft²
Style	Five stories
Construction Materials	Steel frame and roof trusses on reinforced concrete piers corrugated asbestos siding and an asbestos covered metal roof
Construction Date	1944
Heat Source	High pressure steam (190 and 40 lb/sq inch) was supplied from the basement of Building 3 to Building 2 via a 6 inch line that split into two headers The headers fed at least 36 unit heaters Steam was also used to preheat the oil being fed to the rotary furnaces Steam condensate was pumped back to the basement of Building 3 recirculation
Historical Use	
Occupants/Lessees	1944 to 1983 SLAAP (105 mm Howitzer shell production)
Operational Periods	1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1966 to 1969 105 mm Howitzer shell production
Historical Processes	
Process Description	The building contained 10 gas and oil fired rotary furnaces for slug heating and forging Cut steel billets from Building 1 were forged into hollow cylinders After forging the billets were cooled by water spraying and quenching Various hydraulic systems were also used in the production process
Process Machinery	Rotary furnaces piercing presses sizing and de scaling units hydraulic draw benches conveyors accumulators air hammers cooling tanks oil heaters cranes metal grinders transformers and air compressor motors and cylinders
Process Utilities	Electricity water fuel oil compressed air steam and natural gas
Hazardous Material Information	
Possible Hazardous Material Used	Hydraulic and fuel oils solvents (toluene) asbestos LBP quench water and machine lubricant oils
Hazardous Material Storage and Usage Areas	First Floor A fuel oil distribution system hydraulic oil systems and cooling tanks Second Floor Two transformers and switches Outside A 10 000 gallon regular (leaded) gasoline UST and dispenser (abandoned and filled with sand in 1959 removed in 1992)
Hazardous Material Off Loading Areas	The UST was filled using a fill port on top of the tank Fuel oil was off loaded into pipes contained in loading pits These pits were located north of Building 2 from 1944 to 1958 and east of the building from 1958 to 1969

Table 1 3 Summary of Physical Features for Building 3

Building Characteristics	
Building Name	Machining Building (also known as Building 202ABC)
Area	Basement 37 000 square feet (ft²) First Floor 168 000 ft² Second Floor 154 780 ft² Penthouse 6 813 ft²
Style	Two stories basement and two penthouses
Construction Materials	Steel frame and roof beams on reinforced concrete piers and spread footings masonry walls and a prefabricated concrete roof The eastside addition has the same structure but also is covered with asbestos siding
Construction Date	Built in 1941 retooled (including eastside addition) in 1944 Renovated to create office space in 1984 and 1985
Heat Source	High pressure steam (190 lb) was supplied to the basement of Building 3 via a line that came from the main Core Plant Building The steam appears to have been supplied by the main Core Plant Building even after SLOP was excessed
Historical Use	
Occupants/Lessees	1941 to 1944 SLOP (0 30-caliber munitions production) 1944 to 1983 SLAAP (105 millimeter (mm) Howitzer shell production) 1985 to 1996 SLAAP (AVSCOM office space)
Operational Periods	1941 to 1944 0 30 caliber munitions production 1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1966 to 1969 105 mm Howitzer shell production 1985 to 1996 Office space
Historical Processes	
Process Description	Processes completed in Building 3 consisted of shell shaping heat tracing cleaning painting and packaging for shipment Metal chips and fragments produced as a result of the shell machining processes were collected on the first and second floors and disposed in the chip chute The chip chute is an open chute along the north wall that opened to the basement in Building 3 From the basement the metal chips were transferred to a railcar via conveyor for off site disposal
Process Machinery	Process machinery included lathes drill presses milling machines grinders heat treating furnaces wash racks welders shapers shot blasting equipment paint spray booths transformers air compressors and auxiliary equipment (dust collection devices elevators and conveyors)
Process Utilities	Water steam compressed air soluble oil quench oil paint natural gas telephone service and electricity
Hazardous Material Information	
Possible Hazardous Material Used	Cutting (soluble) oil quench oil (No 6 fuel oil) hydraulic oil solvents (toluene) asbestos lead based paint and pesticides
Hazardous Material Storage and Usage Areas	Basement Chip chute 6 inch diameter quench oil lines to sludge tank transformer vaults quench oil pump station First Floor Cutting oil distribution system soluble oil and mixing room 14 quench oil tanks paint storage room hydraulic oil reclaiming unit five wash racks five paint spray booths paint stripping room Second floor Cutting oil distribution system heat treating quench oil
Hazardous Material Off Loading Areas	The quench oil USTs at Building 8 had remote fill capability from railroad tracks on the northeast side of Building 3

Table 1 4 Summary of Physical Features for Building 4

Building Characteristics	
Building Name	Air Compressor Building
Area	Basement 2 772 ft² First Floor 8 450 ft²
Style	One story with basement on the western side
Construction Materials	Steel frame and roof beams on reinforced concrete piers and spread footings and has corrugated asbestos siding and roof
Construction Date	1944
Heat Source	Heat was provided by a 3 inch steam line that came from the basement of Building 3 The line fed three unit heaters in the compressor room and two heaters in the electrical room A steam condensate return system was located in the compressor room
Historical Use	
Occupants/Lessees	1944 to 1983 SLAAP (105 mm Howitzer shell production)
Operational Periods	1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1966 to 1969 105 mm Howitzer shell production
Historical Processes	
Process Description	Housed air compressors used to generate compressed air for processes performed in the other SLAAP buildings
Process Machinery	Compressor motors and cylinders intercoolers aftercoolers and air receivers
Process Utilities	Electricity water compressed air and steam
Hazardous Material Information	
Possible Hazardous Material Used	ACM LBP and hydraulic and motor oils
Hazardous Material Storage and Usage Areas	Two transformers
Hazardous Material Off Loading Areas	None

Table 1 5 Summary of Physical Features for Building 5

Building Characteristics	
Building Name	Headquarters and Office Building (also known as Building 202D)
Area	Basement 1 153 ft² First Floor 11 662 ft² Second Floor 10 075 ft² Penthouse 392 ft²
Style	Two stories with basement and penthouse
Construction Materials	Steel framework with reinforced concrete (brick covered) walls and piers with spread footings The floors are reinforced concrete Some corrugated asbestos siding was used on certain walls The building has a pre cast concrete roof with insulation board underneath
Construction Date	Built in 1941 altered in 1944 to office space Renovated and upgraded in 1984
Heat Source	Hot water radiators
Historical Use	
Occupants/Lessees	1941 to 1944 SLOP (primer building) 1944 to 1983 SLAAP (office space) 1962 to 1967 Futura Manufacturing Company (assembly of radios) 1985 to 1996 SLAAP (AVSCOM office space)
Operational Periods	1941 to 1944 Primer loading 1944 to 1945 Office space 1952 to 1954 Office space 1962 to 1967 Assembly of pocket sized radios 1966 to 1969 Office space 1985 to 1996 Office space
Historical Processes	
Process Description	Served as a primer loading plant for 0 30 caliber ammunition from 1941 until 1944 when the machinery was removed and office space renovations were conducted This building was also leased from 1962 to 1967 to the Futura Manufacturing Company for assembly of pocket sized radios
Process Machinery	Small arms ammunition loading machinery until 1944 an elevator and steam unit heaters
Process Utilities	Water steam telephone service and electricity
Hazardous Material Information	
Possible Hazardous Material Used	Hydraulic oil ACM LBP cleaners transformer oil primers solvents metals and light ballasts
Hazardous Material Storage and Usage Areas	Transformers light ballasts and oil storage outside
Hazardous Material Off Loading Areas	None

Table 1 6 Summary of Physical Features for Building 6

Building Characteristics	
Building Name	West Office and Laboratory Building (also known as Building 202E)
Area	Basement 1 153 ft² First Floor 9 825 ft² Second Floor 10 477 ft² Penthouse 118 ft²
Style	Two stories with basement and penthouse
Construction Materials	Steel framework with reinforced concrete (brick covered) walls and piers with spread footings The floors are reinforced concrete Some corrugated asbestos siding was used on certain walls The building has a pre cast concrete roof with insulation board underneath
Construction Date	Built in 1941 altered in 1944 to office space
Heat Source	Hot water radiators
Historical Use	
Occupants/Lessees	1941 to 1944 SLOP (small arms primer insert building) 1944 to 1983 SLAAP (office space and laboratory) 1985 to 1996 SLAAP (AVSCOM office space)
Operational Periods	1941 to 1944 Small arms primer insertion 1944 to 1945 Office and laboratory space 1952 to 1954 Office and laboratory space 1966 to 1969 Office and laboratory space 1985 to 1996 Office space
Historical Processes	
Process Description	Utilized for small arms primer insertion from 1941 until 1944 when the machinery was removed and office space renovations were conducted A metallurgical laboratory occupied a small part on the first floor and performed quality control testing Operations included polishing measuring and some etching
Process Machinery	Small arms primer insertion machinery ventilators for the laboratory a dark room radiators and steam unit heaters
Process Utilities	Water steam telephone service and electricity
Hazardous Material Information	
Possible Hazardous Material Used	Small amounts of unidentified laboratory chemicals and solvents as well as hydraulic oil ACM LBP cleaners transformer oil and light ballasts
Hazardous Material Storage and Usage Areas	Transformers light ballasts and the laboratory
Hazardous Material Off Loading Areas	None

Table 1 7 Summary of Physical Features for Building 7

Building Characteristics	
Building Name	Water Pump House (Bldg 7) and Cooling Tower (Bldg 7A)
Area	Building 7 1 048 ft² Building 7A 635 ft²
Style	Building 7 is one story cooling tower was 15 feet tall (demolished)
Construction Materials	Building 7 is constructed of concrete block walls a reinforced concrete floor on a reinforced concrete slab and a tar and gravel roof The cooling tower is a wooden frame tower on a concrete base
Construction Date	1944
Heat Source	Heat was provided by a steam line that came from the basement of Building 3 The line fed two unit heaters in the pump room
Historical Use	
Occupants/Lessees	1944 to 1983 SLAAP (105 mm Howitzer shell production)
Operational Periods	1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1966 to 1969 105 mm Howitzer shell production
Historical Processes	
Process Description	Building 7 housed water pumps used to circulate process (coolant) water between Buildings 2 and 4 A cooling tower (Building 7A) was located east of Building 7
Process Machinery	Water pumps and piping
Process Utilities	Electricity water compressed air and steam
Hazardous Material Information	
Possible Hazardous Material Used	ACM and LBP in Building 7 Hexavalent chromium associated with the cooling tower
Hazardous Material Storage and Usage Areas	None
Hazardous Material Off Loading Areas	None

Table 1 8 Summary of Physical Features for Building 8

Building Characteristics	
Building Name	Fuel Storage Area (Bldg 8) and Oil Pumphouse (Bldg 8A)
Area	Building 8 1 048 ft² Building 8A 635 ft²
Style	The Fuel Storage Area is a square area bounded by earthen dams on three sides and a natural slope on the fourth The Storage Area was divided into three equal sections by walls Building 8A is one story
Construction Materials	Building 8 had concrete block walls and earthen dams Building 8A has concrete block walls a reinforced concrete slab floor and a tar and gravel roof
Construction Date	1944
Heat Source	A 4 inch steam line was available at the fuel oil storage areas for heating purposes
Historical Use	
Occupants/Lessees	1944 to 1983 SLAAP (105 mm Howitzer shell production)
Operational Periods	1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1966 to 1969 105 mm Howitzer shell production
Historical Processes	
Process Description	From 1944 to 1969 Building 8 was used to store fuel oil used by the rotary furnaces and other process machinery in Building 2 The fuel was pumped into Building 2 from storage tanks in Building 8 utilizing pumps located in Building 8A (Note From 1944 to 1958 Building 8 was located north of Building 2 In 1958 Building 8 was relocated to the east side of Building 2 in order to make way for Interstate 70 construction) The storage tanks were removed and donated to the Missouri Department of Transportation in 1986
Process Machinery	ASTs piping oil pumps and oil heaters
Process Utilities	Electricity water foamite fire retardant fuel oil compressed air and steam
Hazardous Material Information	
Possible Hazardous Material Used	Fuel oil in Building 8 Fuel oil ACM LBP in Building 8A
Hazardous Material Storage and Usage Areas	Fuel oil stored in nine 16 000 to 19 000 gallon ASTs and an oil drain sump used to temporarily store dirty" return oil from Building 8A oil pumps
Hazardous Material Off Loading Areas	From 1944 to 1958 oil was off loaded from trucks into pipes in two loading pits located south of Building 8 at the top of the natural slope The exact location of Building 8 from 1958 to 1969 is not known but it was likely located east of Building 2

Table 1 9 Summary of Physical Features for Building 9

Building Characteristics				
Building Name	Acetylene Generation Area			
Area	Building 9	1 228 ft²	Building 9A	2 061 ft²
	Building 9B	378 ft²	Building 9C	Not applicable
	Building 9D	455 ft²		
Style	Building 9	Single story	Building 9A	Single story
	Building 9B	Sludge pit	Building 9C	AST
	Building 9D	Single story		
Construction Materials	Building 9	Wooden frame rafters and roof tile walls and a concrete floor		
	Building 9A	Concrete walls and floor wooden rafters and decking		
	Building 9B	Reinforced concrete		
	Building 9C	Steel with reinforced concrete supports		
	Building 9D	Concrete walls and floor wooden rafters and roof decking		
Construction Date	Built in 1941 and modified in 1944 Acetylene Generator Building Sludge Pits and Oxygen Receiver removed in early 1980s			
Heat Source	Unknown likely unheated			
Historical Use				
Occupants/Lessees	1944 to 1983 SLAAP (105 mm Howitzer shell production)			
Operational Periods	1941 to 1944 Smokeless powder storage and canning			
	1944 to 1945 105 mm Howitzer shell production			
	1952 to 1954 105 mm Howitzer shell production			
	1966 to 1969 105 mm Howitzer shell production			
Historical Processes				
Process Description	The Acetylene Generation Area supported acetylene production for SLAAP Acetylene was generated by mixing calcium carbide and water The reaction was contained in four acetylene generators in Building 9 Acetylene was then distributed through underground piping to Buildings 2 and 3 The byproduct of this reaction calcium hydroxide slurry was stored in two sludge pits located in Building 9 until it was transported off site			
Process Machinery	Acetylene generators pumps a cold oxygen converter and piping			
Process Utilities	Acetylene water compressed air and electricity			
Hazardous Material Information				
Possible Hazardous Material Used	Smokeless powder calcium carbide machining cooling oil sludges ACM and LBP			
Hazardous Material Storage and Usage Areas	Building 9	Smokeless powder drip pots under acetylene generators		
	Building 9A	Storehouse for calcium carbide		
	Building 9B	Sludge pits with a sewer outfall		
	Building 9C	AST for oxygen		
	Building 9D	Cold oxygen converter		
Hazardous Material Off Loading Areas	Sludges were pumped into trucks through a piping system installed on the north side of the Sludge Pits The Sludge Pits were connected to the sewer system by underground piping			

Table 1 10 Summary of Physical Features for Building 10

Building Characteristics	
Building Name	Quench Oil Storage Tanks
Area	Building 10 consisted of three cylindrical steel USTs and one rectangular concrete UST These tanks were located at the east outside end of Building 3 and were aligned in a north south direction The area covered by the USTs is approximately 30 by 100 feet The tanks had the following dimensions Tank No — Dimensions — Capacity (gallons) 87 — 10 feet by 24 feet — 14 100 17 — 10 5 feet by 23 5 feet — 15 222 15 — 10 5 feet by 23 75 feet — 15 332 Sludge pit — 11 feet (W) x 18 feet (L) x 13 feet (D) — 17 000
Style	The USTs were horizontal steel tanks each lying on three 18 inch high saddles resting on a reinforced 12 inch thick concrete foundation A 7/8 inch diameter rod with a turnbuckle was installed on each saddle for fastening the tank to the concrete foundation The quench oil sludge pit was a reinforced concrete structure
Construction Materials	Steel and concrete (see above)
Construction Date	1944
Heat Source	Not applicable for USTs
Historical Use	
Occupants/Lessees	1941 to 1944 SLOP 1944 to 1983 SLAAP 1985 to 1996 AVSCOM
Operational Periods	1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1966 to 1969 105 mm Howitzer shell production 1993 UST removal activities were initiated in Jan 93
Historical Processes	
Process Description	The three quench oil USTs and the sludge pit supplied cooling oil (No 6 fuel oil) to 14 quench oil tanks on the first floor of the east section of Building 3
Process Machinery	Quench oil USTs and a sludge pit
Process Utilities	Electricity lubricating oils compressed air steam and water
Hazardous Material Information	
Possible Hazardous Material Used	Quench oil hydraulic oil solvents (toluene) and heavy metals
Hazardous Material Storage and Usage Areas	Underground The quench oil USTs were connected to 4 supply and return lines from the quench oil pumping room in Building 3 Spills drained to the quench oil sludge pit through a 6 gravity line A second 6 gravity line was connected to the 14 indoor quench oil tank drain lines The sludge pit clear oil return pumping system is located next to the middle section of the east basement wall of Building 3 First Floor Transfer pumps and tanks stored quench oil Second Floor 14 hardening furnaces used quench oil as cooling media Roof 14 evaporative cooling systems cooled quench oil before it was returned to the quench oil system
Hazardous Material Off Loading Areas	The quench oil USTs were filled using fill ports on top of the tanks The quench oil system had a remote 4 fill line capability from railroad tracks on the northeast side of Building 3

Table 1 11 Summary of Physical Features for Building 11

Building Characteristics	
Building Name	Foamite Generator Building (Bldg 11) and Hose Cart Shelters (A and B)
Area	Original building covered 274 ft² current building has approximately same dimensions and incorporates one of the hose cart shelters Buildings 11A and 11B are each approximately 98 ft²
Style	Each of the buildings is one story
Construction Materials	The original Building 11 had concrete block walls resting on a reinforced concrete foundation (including a 2 by 3 foot concrete drain pit) and a wooden roof The building had a glass window with a steel frame and hinged top sections to allow air ventilation The existing building is similar to the original one except that the building also houses the foamite hose cart shelter Each of the hose cart shelters consist of concrete block walls resting on reinforced concrete foundation walls a wooden roof and a reinforced concrete floor
Construction Date	Each of the buildings was constructed in 1944 The current building was built in late 1957 and early 1958
Heat Source	Unknown likely unheated
Historical Use	
Occupants/Lessees	1941 to 1958 SLAAP 1958 to 1983 SLAAP 1985 to 1996 AVSCOM
Operational Periods	1944 to 1945 105 mm Howitzer shell production 1952 to 1954 105 mm Howitzer shell production 1958 Building was demolished during the relocation of Building 8 a new Building 11 constructed west of Building 2 across the roadway 1966 to 1969 105 mm Howitzer shell production May have been operational for fire prevention during shut down periods
Historical Processes	
Process Description	Generation of foamite involved the addition of dry foamite powder to pressurized water through an education system The original system included a 15 horsepower pump system a foamite generator and a 4 foamite line that left the south corner of Building 11 and split into two main lines The first line ran parallel to the northeast side of Building 2 and included two hydrants located south and west of Building 8A The second line ran along the outer northwest and northeast banks of the earthen dike This line contained two hydrants one north of oil tank 24 and one east of oil tank 20 Additionally independent lines (3) were connected to each oil tank to address localized oil tank fires
Process Machinery	Foamite generator a 15 horsepower motor and pump with switch disconnect foamite distribution line flexible hoses and hose carts
Process Utilities	Water the foamite line steam electricity and a sewer drain
Hazardous Material Information	
Possible Hazardous Material Used	None
Hazardous Material Storage and Usage Areas	None
Hazardous Material Off Loading Areas	None

Table 1 12 Summary of Comprehensive Environmental Baseline Survey Results

Location	Areas of Environmental Concern	Recommendations
Sitewide	ACM	Manage ACM in accordance with Asbestos Hazard Emergency Response Act (AHERA) regulations or requirements
	LBP	Complete LBP assessments and handle accordingly
	Fluorescent light ballast potentially containing PCBs	Remove and dispose of ballasts
Building 1	PCB oil containing electrical equipment	Remove equipment
	PCB oil stain	Decontaminate stained area
	Metal contaminated soil in east storage area and near sewer connections	Assess extent of metal contamination and evaluate remediation alternatives
Building 2	Metal-contaminated surface soil	Characterize and remove soil
	Metal-contaminated sump water	Characterize and remove water
	Chlorinated solvents contaminated groundwater	Extent of contamination was assessed through interpretation of results from groundwater monitoring wells and no further characterization appears warranted
	Potential PCB contamination at former hydraulic oil storage tank area	Evaluate if additional characterization is warranted
Building 3	PCB contaminated concrete floor in basement	Evaluate and implement appropriate remediation
	PCB contaminated soil at basement earthen soil	Characterize and remove
	PCB-contaminated concrete and brick walls in basement and first floor chip chute areas	Evaluate and implement appropriate remediation
	Various equipment in basement	Characterize and remove materials and equipment
	Airborne pesticides detected in basement	Evaluate and implement appropriate remediation
	Cracked and peeling paint and cracked concrete floor	Evaluate in conjunction with future use of property
	Semivolatile organic compound (SVOC) and PCB contaminated soil underneath north loading dock	Assess and remediate soil
	PCB-contaminated drain and sump water	Characterize and remove water
	PCB-contaminated elevator equipment and oil stains in penthouses	Decontaminate or remove equipment or stains
Building 4	PCB oil-containing electrical equipment	Remove equipment
	PCB oil stain under electrical equipment	Decontaminate stained area
	PCB oil stained transformer pad	Decontaminate stained area
	PCB contaminated material in air compressor pits	Characterize and remove material
	SVOC-contaminated soil	SVOC contamination appears to be background condition and no further characterization appears warranted

Location	Areas of Environmental Concern	Recommendations
Building 5	PCB contaminated elevator equipment and oil stains in penthouse	Decontaminate or remove equipment and stains
	SVOC contaminated soil	SVOC contamination may be associated with former SLOP oil storage building
Building 6	Metal-contaminated ash in hearth	Characterize and remove ash
	SVOC contaminated soil	SVOC contamination may be associated with former SLOP oil storage building
Building 7	No areas of environmental concern	No further characterization appears warranted
Building 8 and 8A	SVOC contaminated soil with extent assessed	Extent of SVOC contamination assessed and no further characterization appears warranted
Buildings 9 and 9a through 9D	No areas of concern	No further characterization appears warranted
Building 10	Leaking UST incident extent assessed	No further characterization appears warranted MDNR to provide guidance to close UST
Building 11 11A and 11B	No areas of concern	No further characterization appears warranted

Table 2 1 Identification of Inputs to the Decision

Location	Area of Environmental Concern	Sampling Method(s) and Rationale
Site Wide	Asbestos Containing Material	No site wide sampling of ACM is proposed The presence of ACM throughout the site is documented in the Comprehensive EBS Approaches to removal of ACM are well understood and readily available These materials will be handled as necessary in accordance with Asbestos Hazard Emergency Response Act (AHERA) and other applicable or relevant and appropriate regulations
	Lead Based Paint	No site wide sampling of LBP is proposed Process knowledge and construction techniques suggest that LBP is present within and around each of the buildings at the site Approaches to removal of LBP are well understood and readily available These materials will be handled as necessary in accordance with appropriate regulations
	Fluorescent light ballast potentially containing PCBs	No site wide sampling is proposed Light ballasts can be removed as appropriate and handled in a compliant manner without collection of additional data during this effort
	Sewer system The EBS report identifies concerns at several buildings with regard to potential releases to the sewer system Given these concerns and the site wide existence of said system the sewers have been added as a site wide category	Sediment and wastewater samples will be collected from sewer mains via manholes (see **Figure 3 10** for sample locations) prior to the initiation of any other sewer system investigations Video surveys of the sewer system will be conducted throughout selected sewer mains as indicated on **Figure 3 10** Contingency borings will be installed and sampled to delineate the lateral extent of contamination in the event breaches in the sewers are identified during the video survey and associated sediment/wastewater samples exceed threshold values for total metals (23) VOCs SVOCs PCBs and/or TPH In addition to the contingency samples at breaches found near contaminated sediments/wastewater soil borings will be advanced at 150 ft intervals along the entire length of the sewer lines and analyzed for total metals (23) VOCs SVOCs PCBs and/or TPH
	Airborne pesticides in basements	Process knowledge suggests that rodent/insect controls may have been utilized in building basements Furthermore soil samples collected in an earlier study and air samples collected in the basement of Building 3 during the comprehensive EBS confirmed the presence of pesticides Consequently soil samples collected in support of the risk assessment in all basements will be analyzed for pesticides
	Groundwater	Groundwater across the site consists of localized perched units that are at least 12 feet below ground surface Most detections to date have been below regulatory guidelines (CALM groundwater target concentrations and/or tap water PRGs) Given the industrial setting of the site and the lack of a completed pathway i e no receptors only limited additional groundwater characterization is required Four new overburden groundwater monitoring wells will be installed Water level measurements and groundwater samples will be collected from all new and existing monitoring wells and analyzed for PCBs SVOCs PAHs Metals VOCs Pesticides Explosives Nitrate and Phosphorus
Building 1	PCB oil containing electrical equipment	No sampling of the equipment for PCBs is proposed Samples can be collected if required during equipment removal as appropriate
	PCB oil stain	A soil boring will be installed at the stain location as shown in **Figure 3 1** Samples will be collected from the concrete (01CS 01) and from the soils beneath the concrete floor (01SB 07) Additionally process knowledge suggests that releases could have occurred from the breaking operations and/or leaking transformers The integrity of the concrete floor and sump structures is unknown Accordingly soil borings will be advanced at two breaking locations (see **Figure 3 1** 01SB 01 and 01SB 02) to evaluate whether or not PCB/TPH contamination exists beneath the building floor Contingency borings will be completed if target thresholds are exceeded to delineate the lateral extent of contamination
	Metal contaminated soil in east storage area and near sewer connections	Process knowledge suggests that releases containing heavy metals could have occurred to soils and the sumps/sewer system as a result of billet storage As shown in **Figure 3 1** soil borings will be sampled at each of the sump locations (near the cold saw cut operations and near the grinding operations 01SB-08 through 01SB 11) Contingency borings will be completed if target thresholds are exceeded Evaluation of the sewer system will be conducted as part of the site wide sewer study (see site wide section above) Soil borings will also be completed along the eastern and western sides of the building (01SB 03 through 01SB 06) and in the east and west parking lot (see **Figure 3 2** locations 01SB 12 through 01SB 17) Contingency borings will be completed if target thresholds are exceeded to delineate the lateral extent of contamination

Table 2 1 Identification of Inputs to the Decision

Location	Area of Environmental Concern	Sampling Method(s) and Rationale
Building 2	Metal-contaminated surface soil Metal-contaminated sump water Chlorinated solvents-contaminated groundwater Potential PCB contamination at former hydraulic oil storage tank area TPH within and under the fuel lines/vaults (regulatory concern mentioned during finalization of the Comprehensive EBS)	Process knowledge suggests that the rotary furnaces quenching operations maintenance area and/or fuel delivery systems may have been responsible for environmental impacts throughout the building footprint Building wide contamination includes TAL/TCL metals VOCs PCBs and/or TPH in surface soils subsurface soils and/or groundwater Accordingly rather than present sampling activities that directly correlate to specific areas of concern from the Comprehensive EBS the sampling strategy for Building 2 is presented from a building wide perspective Investigations planned for Building 2 (see **Figure 3 3** for sample locations) are as follows • Quench tanks within Building 2 overflowed on a regular basis to a series of north/south trending floor drains along the eastern and western perimeter of the building These drains are believed to connect into sewer lines along the interior of the western and southern sides of Building 2 Sediment and water samples will be collected from each of the interior manholes (**Figure 3 3** 02SD 01 through 02SD 03 and 02WW 01 through 02WW 03 respectively) in accordance with protocols presented in Section 5 of this FSP Evaluation of the sewer system (i e those portions of the sewer drain system outside of the building s footprint will be conducted as part of the site wide sewer study) • The foundation rings for each of the rotary furnaces and accompanying production loop (i e process area including descaling station piercing operations draw bench area etc) are potential collection areas for hydraulic oil lubricants and/or fuel The structural integrity of these structures is unknown Accordingly two of the production loops will be excavated to determine the likelihood and degree of contamination present within and/or from these units Sample locations (see **Figure 3 3**) 02TX 01 through 02TX 04 delineate samples to be collected from the first production loop Sample locations 02TX 05 through 02TX-08 delineate samples to be collected from the second production loop Suspicious sediments or residues within the structures will be sampled if encountered A ram hoe attachment or equivalent equipment will be utilized to break through the concrete to allow sampling of the underlying material Soil samples will be collected from the excavation at each of the production loop stations Contingency soil borings will be completed if target thresholds are exceeded If PCBs are detected in samples from this area archived aliquots of each sample containing PCBs will be analyzed for dioxins A total of 20 refractory bricks (2 from each of the 10 foundation rings) will be collected from the foundation rings for asbestos analysis (to ascertain waste disposal requirements for the bricks) Refractory brick sample locations are shown in **Figure 3-3** by sample locations 02AC 01 through 02AC 20 • Oil stains are present in various locations within the building Surface and subsurface soil samples will be collected for PCB and TPH analysis at locations 02SB 01 through 02SB 04 Contingency samples will be collected to define lateral/vertical extent if appropriate pending evaluation of the initial results to delineate the lateral extent of contamination • An east west trending pipe trench exists within Building 2 that served as a redundant feed system between large pumps in the building Additionally two large above ground storage tanks (one on each side of the building) stored hydraulic oil that was ultimately delivered to the production loops Soil borings will be installed along the redundant feed system and at each of the above ground storage tank locations as indicated in **Figure 3-3** (02SB 05 through 02SB 09) Samples collected from each of the borings will be analyzed for PCBs If PCBs are detected in samples from this area archived aliquots of each sample containing PCBs will be analyzed for dioxins • Sediment samples will be collected from the fuel distribution vaults for TPH analysis Sediment sample locations are shown on **Figure 3 3** as 08SD 01 and 08SD 02
Building 3	See **Appendix B**	Sampling activities in Building 3 were completed in the spring of 2002 The results from these samples will be included in the Site Specific EBS report
Building 4	PCB oil-containing electrical equipment	No sampling of the equipment for PCBs is proposed Samples can be collected if required during equipment removal as appropriate

Table 2 1 Identification of Inputs to the Decision

Location	Area of Environmental Concern	Sampling Method(s) and Rationale
Building 4 (Continued)	PCB oil stain under electrical equipment	PCBs have been detected in oil stains on the concrete floor Consequently samples will be collected from the concrete and the underlying soils to determine the extent of the contamination (see **Figure 3 5** 04CS 01 and 04SB 01) Contingency borings will be installed if necessary to delineate the lateral extent of contamination
	PCB oil stained transformer pads	Wipe samples will be collected in the basement beneath two large transformer bases (one external [04SW 01] and one internal [04SW 02] to the original building footprint as shown in **Figure 3 5**) and analyzed for PCBs If PCBs are detected in excess of the PCB Rule [40 CFR 761] samples will be collected from the concrete and the underlying soils to evaluate the extent of the contamination Contingency borings will be installed if necessary to delineate the lateral extent of contamination
	PCB contaminated material in air compressor pits	Process knowledge suggests that releases could have occurred from leaking compressors The integrity of the concrete floor and pit structures is unknown Accordingly soil borings will be advanced at two locations (04SB 02 and 04SB 03) to determine whether or not PCB/TPH contamination exists within the concrete and/or beneath the building floor Contingency borings will be completed if target thresholds are exceeded Sample locations are shown on **Figure 3 5**
	SVOC contaminated soil	The Comprehensive EBS Report states that SVOC contamination is likely a background condition and no further characterization is warranted
Building 5	PCB-contaminated elevator equipment and oil stains in penthouse	PCBs have been detected in oil staining near the elevator equipment in the penthouse Oil staining has also been visually observed in the elevator shaft Consequently a wipe sample (05SW 01) will be collected from stained area within the elevator shaft Samples of the concrete and the underlying soils will be collected if the wipe sample indicates that PCBs are present Contingency borings will be installed if necessary to delineate the lateral extent of contamination Samples 05MC 01 through 05MC 03 will be collected from mastic beneath the floor tiles and analyzed for PCBs Sample locations are shown on **Figure 3-6**
	SVOC contaminated soil	One soil boring (05SB 01) will be installed at the former oil storage area and sampled for SVOC and TPH Contingency borings will be installed if necessary to delineate the vertical extent of contamination Sample locations are shown on **Figure 3 6**
Building 6	Metal-contaminated ash in hearth	The detection of metal contamination in the hearth ash created a concern with regard to the old ventilation system In an earlier building configuration the dark room and laboratory were adjacent to the hearth room and were all likely tied into the same ventilation ducting Renovation activities would have generally eliminated any contaminants that may have been present However to address the concern with regard to the old ventilation system a wipe sample (06SW 01) and a sediment sample (06SD 01) will be collected from the ventilation ducting in the hearth room and analyzed for metals VOCs and SVOCs Sample locations are shown on **Figure 3 7**
	Suspected PCB contamination in underground tunnel	The underground tunnel between Buildings 3 and 6 has stained areas which are suspected of containing PCBs Consequently wipe samples 06SW 02 through 06SW 05 will be collected and analyzed for PCBs If PCBs are detected in excess of the PCB Rule [40 CFR 761] samples will be collected from the concrete and the underlying soils to evaluate the extent of the contamination Contingency borings will be installed if necessary to delineate the lateral extent of contamination Also samples 06MC 01 through 06MC 03 will be collected from mastic beneath the floor tiles and analyzed for PCBs Sample locations are shown on **Figure 3-7**
	SVOC contaminated soil	One soil boring (06SB 01) will be installed at the former oil storage area and sampled for SVOC and TPH Contingency borings will be installed if necessary to delineate the vertical extent of contamination Sample locations are shown on **Figure 3 7**
Building 7	EBS identified no areas of environmental concern however concrete staining in the building and hexavalent chromium from the cooling tower operations will be addressed as part of this FSP	TPH is suspected in stains on the building floor Consequently a concrete sample (07CS 01) and soil boring (07SB 01) will be collected from the stained area and analyzed for TPH Contingency borings will be installed if necessary to delineate the lateral extent of contamination Sample locations are shown on **Figure 3 8** Process knowledge suggests that sediments from the cooling tower operation may contain hexavalent chromium Consequently a test pit (07TX 01) will be excavated within the former cooling tower base to identify whether the sediment layer exists A soil sample will be collected from the sediment layer and analyzed for hexavalent chromium If the analytical results exceed threshold values a trench will be excavated laterally from the test pit to establish the radial extent of contamination Samples will be collected at 10 foot intervals at discrete depth locations from within the trench Sample locations are shown on **Figure 3-8**

Table 2 1 Identification of Inputs to the Decision

Location	Area of Environmental Concern	Sampling Method(s) and Rationale
Building 8 and 8A	SVOC contaminated soil with extent assessed	Extent of SVOC contamination has been assessed as part of the Comprehensive EBS and no further characterization appears warranted
	Regulatory comments on the EBS Report requested additional characterization of the fuel lines leading to Building 2	As noted in the Building 2 description above sediment samples (08SD 01 and 08SD 02) will be collected from within the fuel distribution vaults for TPH analysis Contingency borings will be installed if necessary to delineate the lateral extent of contamination Additionally soil borings (08SB 01 through 08SB 07 will be installed along the fuel distribution pipeline connecting Buildings 2 and 8 Sample locations are shown on **Figure 3 3**
Buildings 9 and 9A through 9D	No areas of concern	No further characterization appears warranted
Building 10	Leaking UST incident extent assessed	Soil borings (10SB 02 through 10SB 05) will be installed at locations outside of the original excavation to determine the levels of residual contamination associated with the USTs Additionally to determine the vertical extent of any residual contamination one soil boring (10SB 01) will be advanced at the location of the former USTs and sampled beneath the buried concrete pad that supported the USTs Soil samples will be analyzed for TPH and BTEX Potential sample locations are shown on **Figure 3 9** but since the extent of the previous excavation is visually evident the actual sample locations just beyond the excavation will be selected in the field Additional contingency borings will be installed if appropriate pending results of the new borings to delineate the lateral extent of any residual contamination
Building 11 11A and 11B	No areas of concern	No further characterization appears warranted

Table 2 2
Analytical Methodologies
St Louis Army Ammunition Plant, St Louis, Missouri

Analysis Type	Matrix								Method
	Concrete	Mastic	Product	Sediment	Soil	Solid	Surface Wipe	Water	
Asbestos						X			600 4 83 043
BTEX					X				SW846 8021
Chloride								X	EPA 325 2
Dioxin					X				SW846 8290
Explosives					X			X	SW846 8330
Fluoride								X	EPA 340 2
Mercury				X	X		X	X	SW846 7470A/7471A
Metals Total				X	X		X	X	SW846 6010B
Nitrate								X	EPA 353 2
PAH					X				SW846 8270C
PAH								X	SW846 8310
PCB	X	X	X	X	X		X	X	SW846 8082
Pesticides					X			X	SW846 8081A
Phosphorus								X	EPA 365 1
SVOC				X	X			X	SW846 8270C
TPH-DRO			X	X	X			X	SW846 8015B
TPH GRO			X	X	X			X	SW846 8015B
VOC				X	X		X	X	SW846 8260B

Legend

BTEX	Benzene Toluene Ethylbenzene and Xylene
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
SVOC	Semi Volatile Organic Compound
TPH	Total Petroleum Hydrocarbon
VOC	Volatile Organic Compound

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 1																	
01CS 01											2						
01SB 01											3				3	3	
01SB 02											3				3	3	
01SB 03							3	3									
01SB 04							3	3		3	3						3
01SB 05							3	3									
01SB 06							3	3									
01SB 07											3						
01SB 08							3	3			3				3	3	
01SB 10 Deep							1	1			1				1	1	
01SB 10 Shallow							2	2			2				2	2	
01SB 10A											1						
01SB 10B											1						
01SB 10C											1						
01SB 11							3	3			3				3	3	
01SB 12							3	3									
01SB 13							3	3									
01SB 14							3	3									
01SB 15							3	3									
01SB 15A								1									
01SB 16							3	3									
01SB 17							3	3									
RA 01SB 01							3	3		3	3						3
RA 01SB 02							3	3		3	3						3
RA 01SB 03							3	3		3	3						3
RA 01SB 04							3	3		3	3						3
RA 01SB 05							3	3		3	3						3
RA 01SB 06							3	3		3	3						3
RA 01SB 07							3	3		3	3						3
RA 01SB 08							3	3		3	3						3
RA 01SB 09							3	3		3	3						3
RA 01SB 10							3	3		3	3						3
Subtotal	0	0	0	0	0	0	69	70	0	33	56	0	0	0	15	15	33

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																	
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 2																	
02AC 01	1																
02AC 02	1																
02AC 03	1																
02AC 04	2																
02AC 05	2																
02AC 06	1																
02AC 07	2																
02AC 08	2																
02AC 09	1																
02AC 10	1																
02AC 11	3																
02AC 12	1																
02AC 13	2																
02AC 14	2																
02AC 15	2																
02AC 16	3																
02AC 17	1																
02AC 18	1																
02AC 19	1																
02AC 20	1																
02CS 01											1						
02CS 02											1						
02CS 03											1						
02CS 04											1						
02CS 05											1						
02CS 06											1						
02CS 07											1						
02CS 08											1						
02CS 09											1						
02CS 10											1						
02PD 01											1				1	1	
02PD 02											1						
02SB 01				2							3				3	3	
02SB 02				2							3				3	3	
02SB 03				1							3				3	3	
02SB 04				2							3				3	3	
02SB 05				3							3						
02SB 06											3						
02SB 07				1							3						
02SB 08				1							3						
02SB 09				2							3						
02SB 10				3							3						
02SB 11				3							3						

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 2 (cont)																	
02SB 12				3							3						
02SB 13				3							3						
02SB 14				3							3						
02SB 15				3							3						
02SB 16				3							3						
02SB 17				3							3						
02SB 18				3							3						
02SB 19				3							3						
02SW 01											1						
02TS 01							3	3			3				3	3	3
02TS 02				1			2	2			2				2	2	2
02TS 03				1			2	2			2				2	2	2
02TS 04				1			2	2			2				2	2	2
02TS 05				3			3	3			3				3	3	3
02TS 06				1			2	2			2				2	2	2
02TS 07				1			2	2			2				2	2	2
02TS 08				1			2	2			2				2	2	2
02TS 09				2			2	2			2				2	2	2
RA 02SB 01				3			3	3		3	3						3
RA 02SB 02				2			3	3		3	3						3
RA 02SB 03							3	3		3	3						3
RA 02SB 04				2			3	3		3	3						3
RA 02SB 05							3	3		3	3						3
RA 02SB 06				1			3	3		3	3						3
RA 02SB 07				1			3	3		3	3						3
RA 02SB 08							3	3		3	3						3
RA 02SB 09				3			3	3		3	3						3
RA 02SB 10				3			3	3		3	3						3
RA 02SB 11							3	3		3	3						3
RA 02SB 12							3	3		3	3						3
Subtotal	31	0	0	70	0	0	56	56	0	36	126	0	0	0	33	33	56

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 4																	
04CS 01											2						
04CS 02											1						
04CS 03											1						
04SB 01											3						
04SB 02											3				3	3	
04SB 03											3				3	3	
04SB 04											4						
04SB 05											2						
04SW 01											1						
04SW 02											1						
04SW 03											1						
04SW 04											1						
RA 04SB 01							3	3		3	3	3					3
RA 04SB 01A							2	2		2	2	2					2
RA 04SB 02							2	2		2	2	1					2
RA 04SB 03							3	3		3	3	3					3
RA 04SB 04							3	3		3	3	3					3
RA 04SB 05							3	3		3	3	3					3
RA 04SB 06							3	3		3	3	3					3
RA 04SB 06A							2	2		2	2	2					2
RA 04SB 06B										1							
RA 04SB 07							2	2		2	2	2					2
RA 04SB 08							2	2		2	2	2					2
RA 04SB 08A										1							
RA 04SB 09							1	1		1	1	1					1
RA 04SB 10							2	2		2	2	2					2
Subtotal	0	0	0	0	0	0	28	28	0	30	51	27	0	0	6	6	28

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 5																	
05MC 01											1						
05MC 02											1						
05MC 03											1						
05SB 01										3					3	3	
05SW 01											1						
RA 05SB 01					2		2	2		2	2	2					2
RA 05SB 02					2		2	2		2	2	2					2
RA 05SB 03					2		2	2		2	2	2					2
RA 05SB 04					2		2	2		2	2	2					2
RA 05SB 05					2		2	2		2	2	2					2
RA 05SB 06					2		2	2		2	2	2					2
RA 05SB 07					2		2	2		2	2	2					2
RA 05SB 08					2		2	2		2	2	2					2
RA 05SB 09					2		2	2		2	2	2					2
RA 05SB 10					2		2	2		2	2	2					2
RA 05SB 11					2		2	2		2	2	2					2
RA 05SB 12					2		2	2		2	2	2					2
RA 05SB 13					2		2	2		2	2	2					2
RA 05SB 14					2		2	2		2	2	2					2
RA 05SB 15					2		2	2		2	2	2					2
RA 05SB 16					2		2	2		2	2	2					2
Subtotal	0	0	0	0	32	0	32	32	0	35	36	32	0	0	3	3	32

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 6																	
06MC 01											1						
06MC 02											1						
06MC 03											1						
06SB 01										3					3	3	
06SD 01							1	1						1			1
06SW 01							1	1						1			1
06SW 02											1						
06SW 03											1						
06SW 04											1						
06SW 05											1						
RA 06SB 01					2		2	2		2	2	2					2
RA 06SB 02					2		2	2		2	2	2					2
RA 06SB 03					2		2	2		2	2	2					2
RA 06SB 04					2		2	2		2	2	2					2
RA 06SB 04A							1					1					
RA 06SB 05					2		2	2		2	2	2					2
RA 06SB 06					2		2	2		2	2	2					2
RA 06SB 07					2		2	2		2	2	2					2
RA 06SB 09					2		2	2		2	2	2					2
RA 06SB 10					2		2	2		2	2	2					2
RA 06SB 11					2		2	2		2	2	2					2
RA 06SB 12					2		2	2		2	2	2					2
RA 06SB 13					2		2	2		2	2	2					2
RA 06SB 14					2		2	2		2	2	2					2
RA 06SB 15					2		2	2		2	2	2					2
Subtotal	0	0	0	0	28	0	31	30	0	31	35	29	0	2	3	3	30

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 7																	
07CS 01											1				1	1	
07SB 01															3	3	
RA 07SB 01							3	3		3	3						3
RA 07SB 02							3	3		3	3						3
RA 07SB 02A											1						
RA 07SB 03							3	3		3	3						3
RA 07SB 04							3	3		3	3						3
RA 07SB 05							2	2		2	2						2
RA 07SB 06							3	3		3	3						3
RA 07SB 07							3	3		3	3						3
RA 07SB 08							3	3		3	3						3
RA 07SB 09							2	2		2	2						2
RA 07SB 10							1	1		1	1						1
RA 07SB 11							3	3		3	3						3
RA 07SB 12							3	3		3	3						3
RA 07SB 13							3	3		3	3						3
RA 07SB 14							3	3		3	3						3
RA 07SB 15							3	3		3	3						3
RA 07SB 16							3	3		3	3						3
Subtotal	0	0	0	0	0	0	44	44	0	44	46	0	0	0	4	4	44

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 8																	
08SB 01															3	3	
08SB 02															3	3	
08SB 03															3	3	
08SB 04															3	3	
08SB 05															3	3	
08SB 06															3	3	
08SB 07															3	3	
08SB 07A															1		
08SB 07B															1		
08SB MW02															1	1	
08SD 01															1	1	
08SD 02															1	1	
RA 08SB 01							3	3		3	3						3
RA 08SB 02							3	3		3	3						3
RA 08SB 03							3	3		3	3						3
RA 08SB 04							3	3		3	3						3
RA 08SB 05							3	3		3	3						3
RA 08SB 05A																	1
RA 08SB 06							3	3		3	3						3
RA 08SB 07							3	3		3	3						3
RA 08SB 08							3	3		3	3						3
RA 08SB 09							3	3		3	3						3
RA 08SB 10							3	3		3	3						3
RA 08SB 11							3	3		3	3						3
RA 08SB 12							3	3		3	3						3
RA 08SB 13							3	3		3	3						3
RA 08SB 14							3	3		3	3						3
RA 08SB 15							4	4		4	4				1	1	4
RA 08SB 16							3	3		3	3						3
RA 08SB 16A										1							
RA 08SB 17							3	3		3	3						3
RA 08SB 18							3	3		3	3						3
RA 08SB 19							3	3		3	3						3
RA 08SB 20							3	3		3	3						3
Subtotal	0	0	0	0	0	0	61	61	0	62	61	0	0	0	27	25	62

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Building 10																	
10SB 01		1													1	1	
10SB 01A		3													3	3	
10SB 02		3													3	3	
10SB 03		2													2	2	
10SB 03A		2													2	2	
10SB 04		3													3	3	
10SB 05		3													3	3	
10SB 06															1		
10SB 07															1		
10SB 08															1		
10SB 09															1		
Subtotal	0	17	0	0	0	0	0	0	0	0	0	0	0	0	21	17	0
Northeast Parking Area																	
RA NESB 01							3	3		3	3						3
RA NESB 01A										1							
RA NESB 02							3	3		3	3						3
RA NESB 03							3	3		3	3						3
RA NESB 04							3	3		3	3						3
RA NESB 05							3	3		3	3						3
RA NESB 06							3	3		3	3						3
RA NESB 07							3	3		3	3						3
RA NESB 08							3	3		3	3						3
Subtotal	0	0	0	0	0	0	24	24	0	25	24	0	0	0	0	0	24
Railroads																	
RA RRSB 01							3	3		3	3						3
RA RRSB 02							3	3		3	3						3
RA RRSB 03							3	3		3	3						3
RA RRSB 04							3	3		3	3						3
RA RRSB 05							3	3		3	3						3
RA RRSB 06							3	3		3	3						3
RA RRSB 07							3	3		3	3						3
RA RRSB 08							3	3		3	3						3
RA RRSB 09							3	3		3	3						3
RA RRSB 10							3	3		3	3						3
RA RRSB 10A																	1
RA RRSB 10B																	1
RA RRSB 10C																	1
RA RRSB 10D																	1
RA RRSB 11							3	3		3	3						3
Subtotal	0	0	0	0	0	0	33	33	0	33	33	0	0	0	0	0	37

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Roadways																	
RA RDSB 01							3	3		3	3						3
RA RDSB 01E							3	3		3	3						3
RA RDSB 01EA																	1
RA RDSB 01EB																	1
RA RDSB 02							3	3		3	3						3
RA RDSB 02A										1							
RA RDSB 02B										1							
RA RDSB 02E							3	3		3	3						3
RA RDSB 03							3	3		3	3						3
RA RDSB 03E							3	3		3	3						3
RA RDSB 04							3	3		3	3						3
RA RDSB 04E							3	3		3	3						3
RA RDSB 05							3	3		3	3						3
RA RDSB 05E							3	3		3	3						3
RA RDSB 06							3	3		3	3						3
RA RDSB 06E							3	3		3	3						3
RA RDSB 07							3	3		3	3						3
RA RDSB 07E							3	3		3	3						3
RA RDSB 08							3	3		3	3						3
RA RDSB 08E							3	3		3	3						3
RA RDSB 09							3	3		3	3						3
RA RDSB 09E							3	3		3	3						3
RA RDSB 10							3	3		3	3						3
RA RDSB 10E							3	3		3	3						3
RA RDSB 11							3	3		3	3						3
RA RDSB 11E							3	3		3	3						3
RA RDSB 12							3	3		3	3						3
RA RDSB 12E							3	3		3	3						3
RA RDSB 13					3		3	3		3	3						3
RA RDSB 13E					3		3	3		3	3						3
RA RDSB 14					3		3	3		3	3						3
RA RDSB 14E					3		3	3		3	3						3
RA RDSB 15							3	3		3	3						3
RA RDSB 15E							3	3		3	3						3
RA RDSB 16							3	3		3	3						3
RA RDSB 16E							3	3		3	3						3
RA RDSB 16EA								1									
RA RDSB 16EB								1									
RA RDSB 16EC								1									
Subtotal	0	0	0	0	12	0	96	99	0	98	96	0	0	0	0	0	98

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Sewer System																	
SRSB 01							2	2			2			2	2	2	2
SRSB 02							2	2			2			2	2	2	2
SRSB 03							2	2			2			2	2	2	2
SRSB 04							2	2			2			2	2	2	2
SRSB 05							3	3			3			3	3	3	3
SRSB 06							3	3			3			3	3	3	3
SRSB 07							4	4			4			4	4	4	4
SRSB 08							3	3			3			3	3	3	3
SRSB 09							3	3			3			3	3	3	3
SRSB 10							2	2			2			2	2	2	2
SRSB 11							2	2			2			2	2	2	2
SRSB 12							3	3			3			3	3	3	3
SRSB 13							2	2			2			2	2	2	2
SRSB 14							2	2			2			2	2	2	2
SRSB 15							3	3			3			3	3	3	3
SRSB 16							3	3			3			3	3	3	3
SRSB 16															1		
SRSB 16															1		
SRSB 16															1		
SRSB 16															1		
SRSB 17							2	2			2			2	2	2	2
SRSB 18							2	2			2			2	2	2	2
SRSB 19							3	3			3			3	4	4	3
SRSB 20							2	2			2			2	2	2	2
SRSB 21							3	3			3			3	3	3	3
SRSB 22							3	3			3			3	3	3	3
SRSB 23							3	3			3			3	3	3	3
SRSB 24							3	3			3			3	3	3	3
SRSB 25							3	3			3			3	3	3	3
SRSB 26							3	3			3			3	3	3	3
SRSB 27							3	3			3			3	3	3	3
SRSB 28							2	2			2			2	2	2	2
SRSB 29							3	3			3			3	3	3	3
SRSB 30							3	3			3			3	3	3	3
SRSB 30A										1							
SRSB 30B										1							
SRSB 31							3	3			3			3	3	3	3
SRSB 32							3	3			3			3	3	3	3
SRSB 33							3	3			3			3	3	3	3
SRSB 34							3	3			3			3	3	3	3
SRSB 35							2	2			2			2	2	2	2
SRSB 36							3	3			3			3	3	3	3
SRSB 37							3	3			3			3	3	3	3

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Sewer System (cont)																	
SRSB 38							3	3			3			3	3	3	3
SRSB 39							3	3			3			3	3	3	3
SRSB 40							3	3			3			3	3	3	3
SRSB 41							2	2			2			2	2	2	2
SRSB 42							1	1			1			1	1	1	1
SRSB 44							1	1			1			1	1	1	1
02SD 01							1	1			1				1	1	1
02SD 02							1	1			1				1	1	1
SRSD 02							1	1			1			1	1	1	1
SRSD 02				1							1						
SRSD 03							1	1			1			1	1	1	1
SRSD 04							1	1			1			1	1	1	1
02WW 01							1	1			1				1	1	1
02WW 02							1	1			1				1	1	1
SRWW 01							1	1			1			1	1	1	1
SRWW 02							1	1			1			1	1	1	1
SRWW 03							1	1			1			1	1	1	1
SRWW 04							1	1			1			1	1	1	1
SRWW 06							1	1			1			1	1	1	1
SRWW 07							1	1			1			1	1	1	1
SRWW 10							1	1			1			1	1	1	1
SRWW 11							1	1			1			1	1	1	1
Subtotal	0	0	0	1	0	0	127	127	0	2	128	0	0	123	132	128	127

Table 2 3
Summary of Sample Analyses
St Louis Army Ammunition Plant, St Louis, Missouri

Investigation Area / Sample Location	Analysis Type																
	Asbestos	BTEX	Chloride	Dioxin	Explosives	Fluoride	Mercury	Metals Total	Nitrate	PAH	PCB	Pesticides	Phosphorus	SVOC	TPH DRO	TPH GRO	VOC
Groundwater																	
02MW 01					1		1	1	1	1	1	1	1	1			1
03MW 01			1		1	1	1	1	1	1	1	1	1	1			1
08MW 01					1		1	1	1	1	1	1	1	1			1
08MW 02			1		1	1	1	1	1	1	1	1	1	1			1
08MW 03			1		1	1	1	1	1	1	1	1	1	1			1
10MW 01					1		1	1	1	1	1	1	1	1			1
Fire Hydrant			1			1											
SWMW 01					1		1	1	1	1	1	1	1	1			1
SWMW 02					1		1	1	1	1	1	1	1	1			1
SWMW 03					1		1	1	1	1	1	1	1	1			1
SWMW 04					1		1	1	1	1	1	1	1	1			1
SWMW 05					1		1	1	1	1	1	1	1	1			1
SWMW 06					1		1	1	1	1	1	1	1	1			1
SWMW 07					1		1	1	1	1	1	1	1	1			1
Subtotal	0	0	4	0	13	4	13	13	13	13	13	13	13	13	0	0	13
Regional Background																	
BKSB 01							1	1		1							
BKSB 02							1	1		1							
BKSB 03							1	1		1							
BKSB 04							1	1		1							
BKSB 05							1	1		1							
BKSB 06							1	1		1							
BKSB 07							1	1		1							
BKSB 08							1	1		1							
BKSB 09							1	1		1							
BKSB 10							1	1		1							
Subtotal	0	0	0	0	0	0	10	10	0	10	0	0	0	0	0	0	0
Site Wide Total	31	17	4	71	85	4	624	627	13	452	705	101	13	138	244	234	584

Table 4 1
Background Data for Metals and PAHs
St Louis Army Ammunition Plant, St Louis, Missouri

	BKSB 01(0 0 5) 0902			BKSB 02(0 0 5) 0902			BKSB 03(0 0 5) 0902			BKSB 04(0 0 5) 0902			BKSB 05(0-0 5) 0902		
	Result	Q	QL	Res lt	Q	QL	Result	Q	QL	R lt	Q	QL	Res lt	Q	QL
SEMIVOLATILES (MG/KG)															
Acenaphthene	0 001	J		0 001	J		0 001	J			U	*(0 33)*	0 008	J	
Acenaphthylene	0 001	J			U	*(0 33)*		U	*(0 33)*		U	*(0 33)*	0 004	J	
Anthracene	0 004	J		0 005	J		0 004	J			U	*(0 33)*	0 027	J	
Benzo(a)anthracene	0 046	J		0 043	J		0 033	J		0 003	J		0 15	J	
Be zo(a)pyrene	0 038	J		0 033	J		0 031	J		0 003	J		0 12		
B o(b)fluora th ne	0 063	J		0 056	J		0 05	J		0 006	J		0 14	J	
Benzo(g h ı)perylene	0 031	J		0 028	J		0 023	J			U	(0 062)	0 086		
Benzo(k)fluora the e	0 019	J		0 023	J		0 013	J		0 002	J		0 082	J	
Chrys ne	0 042	J		0 045	J		0 036	J		0 005	J		0 14	J	
Dibenz(a h)anthracene	0 015	J		0 013	J		0 014	J			U	(0 062)	0 058	J	
Fluoranthene	0 08	J		0 073	J		0 063	J		0 008	J		0 27	J	
Fluorene	0 001	J		0 001	J		0 001	J			U	*(0 33)*	0 009	J	
Indeno(1 2 3 cd)pyre e	0 024	J		0 023	J		0 022	J			U	*(0 33)*	0 072	J	
Naphthalene		U	*(0 33)*		U	*(0 33)*		U	*(0 33)*		U	*(0 33)*	*0 003*	J	
Phenanthrene	0 031	J		0 031	J		0 025	J		0 003	J		0 15	J	
Pyre e	0 069	J		0 068	J		0 055	J		0 008	J		0 24	J	
TOTAL METALS (MG/KG)															
Antimony		U	*(20)*		U	*(20)*		U	*(20)*		U	*(20)*		U	*(20)*
Arsenic	7 4			6 3			5 3			3 4			6 8		
Ban m		R			R			R			R			R	
Be ylli m	0 75			0 66			0 65			0 77			0 71		
Cadmium	2 4			2 4			2 3			2 4			2 7		
Chromium	16			17			19			20			17		
C ppe	21			20			17			21			31		
Le d	60			46			34			52			97		
M ury	0 039	J		0 037	J		0 03	J		0 025	J		0 084	J	
Nickel	17			19			15			13			19		
Selenium		U	*(20)*		U	*(20)*		U	*(20)*		U	*(20)*	*3 3*	J	
S l e		U	*(5)*		U	*(5)*		U	*(5)*		U	*(5)*		U	*(5)*
Th lli m	0 3	J		0 26	J		0 17	J		0 19	J		0 28	J	
Zinc	94			86			60			72			136		

Notes
Italics = Data point excluded from 95% UTL calculation
NC – Not calculated due to an nsufficie t number of normally distributed data po ts
Q = Qualifier
QL – Quantitation Limit

Qualif er Notes
NA – Not analyzed
U = Not detected at the g en q ant tat on l mit
J – Concentration s estimated
UJ = Not detected quantitat on limit s an estimate
R = Rejected

Table 4 1
Background Data for Metals and PAHs
St Louis Army Ammunition Plant, St Louis, Missouri

	BKSB 06(0 0 5) 0902			BKSB-07(0 0 5) 0902			BKSB 08(0 0 5) 0902			BKSB 08(0 0 5) 0902 DIL			BKSB 09(0-0 5) 0902		
	Result	Q	QL	Res lt	Q	QL	Result	Q	QL	R lt	Q	QL	R lt	Q	QL
SEMIVOLATILES (MG/KG)															
Acen phthe e	0 009	J		0 027	J		*0 94*				R		0 038	J	
Acenaphthylene	0 006	J		0 012	J		0 016	J			R		0 013	J	
Anthracene	0 045	J		0 076	J			R		*2 4*			0 14	J	
Benzo( )anthrace e	0 23	J		0 43				R		*6 2*			0 56		
Benzo(a)pyre e	0 16			0 31				R		*3 5*			0 51		
Benzo(b)fluoranthene	0 18	J		0 24	J			R		*4 2*			0 41		
Benzo(g h)perylene	0 18			0 2				R		*2 1*			0 32		
Benzo(k)fluoranthene	0 053	J		0 25	J			R		*2 1*			0 28	J	
Chrysene	0 22	J		0 39				R		*6*			0 47		
Dibenz(a h)anthracene	0 086			0 13				R		*1 3*			0 21		
Fluoranthene	0 37	J		0 88				R		*13*				R	
Fl re e	0 013	J		0 029	J		*1*				R		0 049	J	
Indeno(1 2 3 cd)pyrene	0 1	J		0 16	J			R		*1 7*			0 27	J	
Naphthalene	*0 002*	J			U	*(0 33)*	*0 13*	J			R		*0 018*	J	
Phenanthre	0 2	J		0 46				R		*13*			0 7		
Pyrene	0 33			0 66				R		*11*			0 86		
TOTAL METALS (MG/KG)															
A timony		U	*(20)*		U	*(20)*		U	*(20)*		NA			U	*(20)*
Ars nic	5 7			10			*18*				NA		8 1		
Barium		R			R			R			NA			R	
Berylliun	0 65			0 87			*1 4*				NA		0 64		
Cadmium	2 4			3 2			*6 3*				NA		2 9		
Chromium	15			21			*43*				NA		16		
Coppe	25			44			*348*				NA		37		
Lead	139			183			*876*				NA		252		
Mercury	0 065	J		0 097	J		*0 35*				NA		*0 18*		
Nickel	19			22			*40*				NA		18		
Seleni m		U	*(20)*		U	*(20)*		U	*(20)*		NA			U	*(20)*
Sil er		U	*(5)*		U	*(5)*		U	*(5)*		NA			U	*(5)*
Thallium	0 28	J		0 33	J		0 44	J			NA		0 26	J	
Zinc	176			266			*902*				NA		258		

Notes
Italics = Data po nt excluded from 95% UTL calc lation
NC – Not calculated due to an insuff cie t number of normally distributed data points
Q = Qualifier
QL Quantitation Limit

Q al f er Notes
NA Not analyzed
U = Not detected at the gi en quantitatio limit
J Concentratio is estimated
UJ = Not detected, q antitation limit s an estimate
R = Rejected

Table 4 1
Background Data for Metals and PAHs
St Louis Army Ammunition Plant, St Louis, Missouri

	BKSB 09(0 0 5) 0902 DIL			BKSB 10(0-0 5) 0902			95% UTL
	Result	Q	QL	Res lt	Q	QL	
SEMIVOLATILES (MG/KG)							
Acenaphthe e		R		0 01	J		0 0626
Ace phthylene		R		0 004	J		0 0305
Anthracene		R		0 034	J		0 216
Be zo(a)anthracene		R		0 27	J		0 887
Ben o(a)pyrene		R		0 16			0 735
Benzo(b)fluoranthene		R		0 28	J		0 626
Benzo(g h,ı)perylene		R		0 13			0 478
Benzo(k)fluoranthene		R		0 037	J		0 457
Chrysene		R		0 2	J		0 758
D benz(a,h)anthracene		R		0 08			0 303
Fl oranthene	1 1			0 46			1 74
Fluorene		R		0 014	J		0 0774
Indeno(1 2 3 cd)pyrene		R		0 1	J		0 415
Naphthalene		R		*0 002*	J		NC
Phenanth ne		R		0 24	J		1 04
Pyrene		R		0 39			1 35
TOTAL METALS (MG/KG)							
Antimony		NA			U	*(20)*	NC
Arsenic		NA		5 1			13 2
Bari m		NA			R		NC
Beryll um		NA		0 57			1 01
Cadmium		NA		1 9			3 84
Chromi m		NA		14			25 5
Copper		NA		18			59 1
Lead		NA		78			363
Mercury		NA		0 03	J		0 154
N ckel		NA		13			27 9
Selenı m		NA			U	*(20)*	NC
S l e		NA			U	*(5)*	NC
Thallium		NA		0 23	J		0 53
Zinc		NA		99			414

Notes
Italics = D ta point cluded from 95% UTL calc l t on
NC = Not calculated due to an insufficient number of
ormally d strib ted data po nts
Q = Qualif e
QL – Q antitation Limit

Qual fie Notes
NA = Not analyzed
U = Not detected at th gı en quantitatı l mit
J = Concentration is estimated
UJ = Not detected quantitation limit s an estim te
R = Rejected

Table 4 2
Screening Levels for Soil
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA Region IX PRGs (mg/kg) (Residential)	Missouri CALM (mg/kg) (State Action Unrestricted)	Background (mg/kg)	Screening Level (mg/kg)
EPA 160 2		Total suspended solids (TSS)				
EPA 300 0	14797 55 8	Nitrate				
EPA 340 2	16984-48 8	Fluoride	3 700			3 700
EPA 365 3	7723 14-0	Phosphorous	1 6	4		1 6
SW 846 6010B	7440 36-0	Antimony	31	85		31
	7440 38 2	Arsenic	0 39	11	13 2	13 22
	7440 39 3	Barium	5 400	14 000		5 400
	7440-41 7	Beryllium	150	0 05	1 01	1 01
	7440-43 9	Cadmium	37	110	3 84	37
	7440-47 3	Chromium Total	210	2 100	25	210
	7440 50 8	Copper	3 100	1 100	59	1 100
	7439 92 1	Lead	400	260	363	363 49
	7440-02 0	Nickel	1 600	4 800	28	1 600
	7782-49 2	Selenium	390	300		300
	7440-22-4	Silver	390	140		140
	7440-28 0	Thallium	5 2	17	0 53	5 2
	7440-66-6	Zinc	23 000	38 000	415	23 000
SW 846 7196	18540-29 9	Chromium (VI)	30			30
SW 846 7471A/7470A	7439 97 6	Mercury		0 6	0 15	0 6
SW 846 8015B (TPH DRO)		Diesel Fuel				
		Fuel Oil				
		Gasoline				
		Jet Fuel				
		Kerosene				
		Mineral Spirits				
		Motor Oil				
		Total Petroleum Hydrocarbons (TPH)		200		200
SW 846 8015B (TPH GRO)		Gasoline Range Organics (GRO				
SW 846 8081A	72 54 8	4 4 DDD	2 4	12		2 4
	72 55 9	4 4 DDE	1 7	8		1 7
	50 29 3	4 4 DDT	1 7	8		1 7
	309 00-2	Aldrin	0 029	0 1		0 029
	319 84 6	alpha BHC	0 09	0 3		0 09
	5103 71 9	alpha Chlordane	1 6	7		1 6
	959 98 8	alpha Endosulfan	370	420		370
	319 85 7	beta BHC	0 32	0 9		0 32
	33213 65 9	beta Endosulfan	370	420		370
	12789 03 6	Chlordane	1 6	7		1 6
	319 86-8	delta BHC				
	60 57 1	Dieldrin	0 03	0 1		0 03
	115 29 7	Endosulfan	370	420		370
	1031 07 8	Endosulfan Sulfate				
	72 20 8	Endrin	18	21		18
	7421 93-4	Endrin Aldehyde				
	53494-70-5	Endrin Ketone				
	58 89 9	gamma BHC	0 44	1		0 44
	5103 74-2	gamma Chlordane	1 6	7		1 6
	76-44 8	Heptachlor	0 11	0 3		0 11
	1024 57 3	Heptachlor Epoxide	0 053	0 2		0 053
	72-43 5	Methoxychlor	310	350		310
	8001 35 2	Toxaphene	0 44	1		0 44

Table 4 2
Screening Levels for Soil
St Louis Army Ammunition Plant, St Louis Missouri

M thod	CAS	A alyte	EPA R g IX PRGs (mg/kg) (Resid tial)	Miss CALM (mg/kg) (S A U rest l t d)	Backgro d (mg/kg)	Sc ee g Le l (mg/kg)
SW 846 8082	12674-11 2	PCB 1016	3 9			3 9
	11104-28 2	PCB 1221	0 22			0 22
	11141 16-5	PCB 1232	0 22			0 22
	53469 21 9	PCB 1242	0 22			0 22
	12672 29 6	PCB 1248	0 22			0 22
	11097 69 1	PCB 1254	0 22			0 22
	11096-82 5	PCB 1260	0 22			0 22
	1336 36-3	Total Polychlorinated B phenyls (PCBs	0 22	0 6		0 22
SW 846 8260B	630-20-6	1 1 1 2 Tetrachlo oethane	3 2	10		3 2
	71 55 6	1 1 1 T chl oethane	1 200	1 200		1200
	79 34 5	1 1 2 2 Tetrachlo oethane	0 41	2		0 41
	79 00 5	1 1 2 Trichlo oethane	0 73	5		0 73
	75 34 3	1 1 D chloroethane	510			510
	75 35-4	1 1 D chloroethene	120	0 4		0 4
	563 58 6	1 1 D hlo op opene				
	87 61 6	1 2 3 Trichlorobenzene				
	120-82 1	1 2 4 Trichlo obenzene	650	270		270
	95 63 6	1 2 4-Trimethylbenzene	52	100		52
	106-93-4	1 2 Dibromoethane	0 0069			0 0069
	95 50 1	1 2 Dichlorobenze	370	600		370
	107 06-2	1 2 D chloroetha e	0 28	2		0 28
	78 87 5	1 2 D chlo p opane	0 34	10		0 34
	108 67 8	1 3 5 Trimethylbenzene	21	42		21
	541 73 1	1 3-D chlorobenzene	16			16
	142 28 9	1 3-Dichloropropane				
	542 75 6	1 3 D chloroprope	0 78	0 9		0 78
	106-46-7	1 4-Dichlo obenzen	3 4	17		3 4
	594-20-7	2 2 D chlo op opane				
	78 93 3	2 Butanone	7 300	7 400		7 300
	110-75 8	2 Chloroethyl nyl ethe				
	95-49 8	2 Chlor toluene	160			160
	591 78 6	2 Hexanone				
	106-43-4	4-Chlorotoluene				
	99 87 6	4-Isopropyltol e e				
	108 10-1	4-Methyl 2 pentano e	790	1 000		790
	67 64-1	Acetone	1 600	2 700		1 600
	107 02 8	Acrol in	0 1			0 1
	107 13 1	Acrylonitrile	0 21	0 8		0 21
	71-43 2	Benzene	0 6	6		0 6
	108 86-1	B mob n en	28			28
	74 97 5	B omochlorom thane				
	75 25 2	Bromoform	62	140		62
	74-83 9	B omom thane	3 9			3 9
	75 15 0	Carbon d sulf d	360	630		360
	56-23 5	Carbon t trachlorid	0 25	2		0 25
	108 90-7	Chlorobenz e	150	66		66
	75 00 3	Chloroethan	3			3
	67 66-3	Chloroform	3 6	0 8		0 8
	74 87 3	Chloromethane	1 2			1 2
	156-59 2	c s 1 2 D chloroethe e	43	1 200		43

Table 4 2
Screening Levels for Soil
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA R g on IX PRGs (mg/kg) (Resid tl l)	M s ri CALM (mg/kg) (S A U rest t d)	Backg o nd (mg/kg)	Sc eeni g Le l (mg/kg)
SW 846 8260B (co t)	10061 01 5	c s 1 3 D chloropropene	0 78	0 9		0 78
	124-48 1	D bromochlorometh e	1 1	20		1 1
	74 95 3	Dibromomethane	67			67
	75 27-4	Dichlo ob omomethane	0 82	11		0 82
	75 71 8	D chlorod fluoromethane	94			94
	100-41-4	Ethylbe ze e	8 9	400		8 9
	87 68 3	Hexachlorob tadiene	6 2	14		6 2
	98 82 8	Isopropylbe ze	570	210		210
	1634 04-4	Methyl tertuary butyl ethe	62	8 760		62
	75 09 2	Methylene chlonde	9 1	51		9 1
	91 20 3	N phthalene	56	120		56
	104-51 8	n Butylbe ene	240			240
	103 65 1	Propylbe zene	240	28		28
	135 98 8	sec Butylbenzene	220			220
	100-42 5	Styrene	1 700	1 500		1 500
	98 06-6	tert Butylbenzene	390			390
	127 18-4	Tetrachloroethene	1 5	40		1 5
	108 88 3	Tol e	520	650		520
	156-60-5	trans 1 2 Dichloroethene	69	2 900		69
	10061 02 6	trans 1 3 D chloropropen	0 78	0 9		0 78
	79 01 6	Trichl oeth	0 053	40		0 053
	75 01-4	V yl chl ride	0 079	0 3		0 079
	1330-20-7	Xylenes (Total)	270	418		270
SW 846 8270C	120-82 1	1 2 4-Trichlo obenzene	650	270		270
	95 50-1	1 2 D hlorobenzene	370	600		370
	122 66-7	1 2 Diphenylhyd azi e	0 61			0 61
	541 73 1	1 3 D chlorobenze	16			16
	106-46-7	1 4-D hlo obenze e	3 4	17		3 4
	95 95-4	2 4 5 Trichlorophenol	6 100	7 000		6 100
	88 06-2	2 4 6-Trichlo ophenol	6 1	140		6 1
	120-83 2	2 4-D chlo ophenol	180	210		180
	105 67 9	2 4-Dimethylphenol	1 200	1 400		1 200
	51 28 5	2 4-Dinitrophenol	120	140		120
	121 14-2	2 4-Din tr toluene	120	2		2
	606-20-2	2 6-D n trotol ene	61	2		2
	91 58 7	2 Chlo onaphthale	4 900			4 900
	95 57 8	2 Chlorophenol	63	140		63
	91 57 6	2 Methyl phthal				
	95-48 7	2 M thylphenol	3 100	3 500		3 100
	88 74-4	2 N tr an l e	1 7			1 7
	88 75 5	2 N trophen l				
	91 94 1	3 3 D chlo ob z d	1 1	4		1 1
	99 09 2	3 Nitroan lin				
	534-52 1	4 6-D tro 2 Methylphe ol				
	101 55 3	4-Bromophe yl phe yl ethe		150		150
	59 50-7	4-Chloro-3 m thylphenol				
	106-47 8	4-Chloroan l ne	240	280		240
	7005 72 3	4-Chlorophenyl phenyl ethei				
	106-44-5	4-Methylphenol	310	250		250
	100-01 6	4-N troan l ne				
	100-02 7	4-Nitrophenol				
	83 32 9	Acenaphthene	3 700	1 700	0 06	1 700
	208 96-8	Acenaphthylene			0 03	0 03

Table 4 2
Screening Levels for Soil
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA R g IX PRGs (mg/kg) (Res dential)	Mi s ri CALM (mg/kg) (Scena io A U restrict d)	Background (mg/kg)	Scre ni g Le el (mg/kg)
SW 846 8270C (cont.)	120-12 7	Anthrace e	22 000	8 500	0 22	8 500
	92 87 5	Be zid ne	0 0021	0 01		0 0021
	56-55 3	Benzo(a)anthracene	0 62	1	0 89	0 89
	50-32 8	Benzo(a)pyrene	0 062	0 2	0 74	0 74
	205 99 2	Benzo(b)fluoranthe e	0 62	0 9	0 63	0 63
	191 24-2	Benzo(g h ı)perylene			0 48	0 48
	207 08 9	Be zo(k)fluoranthene	6 2	8	0 46	6 2
	111 91 1	Bıs(2 Chloroethoxy)methane				
	111-44-4	Bıs(2 Chloroethyl)ethe	0 21	0 5		0 21
	108 60-1	B s(2 Chlo o sopropyl)ethe	2 9	8		2 9
	117 81 7	B s(2 Ethylhexyl)phthalate	35	410		35
	85 68 7	Butyl benzyl phthalate	12 000	930		930
	86 74-8	Carbazole	24	82		24
	218 01 9	Chrysene	62	36	0 76	36
	53 70-3	D benz(a h)anth ace	0 062	0 2	0 3	0 3
	132 64 9	D benzofuran	290	110		110
	84 66-2	D ethylphthalate	49 000	2 000		2 000
	131 11 3	D m thylphthalate	100 000	1 360		1 360
	84-74-2	D n butylphthalate	6 100	2 300		2 300
	25321 14-6	D nıtrotoluene Mixture	0 72			0 72
	117 84-0	Dı n octylphthal te	2 400	0 3		0 3
	122 39 4	D phenylamine	1 500	1 800		1 500
	206-44-0	Fluoranthene	2 300	1 600	2	1 600
	86-73 7	Fluor e	2 700	1 100	0 08	1 100
	118 74-1	H achlo obenzene	0 3	0 9		0 3
	77-47-4	H achlorocyclopentadıene	370	9		9
	67 72 1	Hexachloroethane	35	70		35
	193 39 5	I deno(1 2 3 cd)pyre e	0 62	3	0 41	0 62
	78 59 1	Isopho o e	510	1 700		510
	91 20-3	Naphthal n	56	120		56
	98 95 3	N trobenze e	20	12		12
	62 75 9	N Nıtrosodımethylamı e	0 0095	0 03		0 0095
	86-30-6	N N trosodıph nyl m e	99	330		99
	621 64-7	N N trosodıpropylamine	0 069			0 069
	87 86-5	Pentachlo ophenol	3	6		3
	85 01 8	Phenanthr ne			1 04	1 04
	108 95 2	Phe ol	37 000	5 200		5 200
	129-00-0	Py ene	2 300	2 100	1	2 100

Table 4 2
Screening Levels for Soil
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA Reg IX PRGs (mg/kg) (R id ti l)	Missouri CALM (mg/kg) (Scena i A U rest icted)	Ba kg und (mg/kg)	Screeni g L el (mg/kg)
SW 846 8290	3268 87 9	1 2 3 4 6 7 8 9 OCDD				
	39001 02 0	1 2 3 4 6 7 8 9 OCDF				
	35822-46-9	1 2 3 4 6 7 8 HpCDD				
	67562 39-4	1 2 3 4 6 7 8 HpCDF				
	39227 28 6	1 2 3 4 7 8 9 HpCDF				
	55673 89 7	1 2 3 4 7 8 HxCDD				
	70648 26-9	1 2 3 4 7 8 HxCDF				
	57653 85 7	1 2 3 6 7 8 HxCDD				
	57117-44-9	1 2 3 6 7 8 H CDF				
	19408 74-3	1 2 3 7 8 9 HxCDD				
	72918 21 9	1 2 3 7 8 9 H CDF				
	40321 76-4	1 2 3 7 8 PeCDD				
	57117-41 6	1 2 3 7 8 PeCDF				
	60851 34-5	2 3 4 6 7 8 HxCDF				
	57117 31-4	2 3 4 7 8 PeCDF				
	1746 01 6	2 3 7 8 TCDD	0 0000039			0 0000039
	51207 31 9	2 3 7 8 TCDF				
SW 846 8330	99 35-4	1 3 5 Trinitrobenze e	1 800	2 100		1 800
	99 65 0	1 3 Di trobenze e	6 1	7		6 1
	118 96-7	2 4 6-Trin trotoluene	16	35		16
	121 14-2	2 4-D n trotoluene	120	2		2
	606-20-2	2 6-D trotoluene	61	2		2
	35572 78 2	2 Ami o-4 6-din trotoluene				
	88 72 2	2 N trotoluene	370			370
	99 08 1	3 N trotol e	370			370
	19406-51 0	4-Am o-2 6 din trotol e e				
	99 99 0	4-Nitrotolue e	370			370
	25321 14-6	D n trotolue e M tu e	0 72			0 72
	121 82-4	Hexahydro-1 3 5 trinitro-1 3 5 triaz ne	4 4	15		4 4
	479-45 8	Methyl 2 4 6-tri trophe yln tram n	610			610
	98 95 3	N trobenzene	20	12		12
	2691-41 0	Octahydro-1 3 5 7 tetran tro-1 3 5 7 tetrazoc ne	3 100	3 500		3 100
SW 846 9012	74 90 8	Cyan de	11	5 480		11
SW 846 9070/9071A		O l and Grease				

Notes
mg/kg = mill grams per kilogran
-- No alue established

Table 4 3
Screening Levels for Water
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA Region IX PRGs (µg/L) (Tap Water)	Missouri CALM (µg/L) (Groundwater Target Chronic)	Screening Level (µg/L)
EPA 160 2		Total suspended solid (TSS)			
EPA 300 0	14797-55-8	Nitrate	10 000		10 000
EPA 340 2	16984-48-8	Fluoride	2 200		2 200
EPA 365 3	7723-14-0	Phosphorous	0 73	0 1	0 1
SW 846 6010B	7440-36-0	Antimony	15	6	6
	7440-38-2	Arsenic	0 045	50	0 045
	7440-39-3	Barium	2 600	2 000	2 000
	7440-41-7	Beryllium	73	4	4
	7440-43-9	Cadmium	18	5	5
	7440-47-3	Chromium, Total		100	100
	7440-50-8	Copper	1 500	1 300	1 300
	7439-92-1	Lead		15	15
	7440-02-0	Nickel	730	100	100
	7782-49-2	Selenium	180	50	50
	7440-22-4	Silver	180	100	100
	7440-28-0	Thallium	2 4	2	2
	7440-66-6	Zinc	11 000	2 000	2 000
SW 846 7196	18540-29-9	Chromium (VI	110		110
SW 846 7471A/7470A	7439-97-6	Mercury		2	2
SW 846 8015B (TPH DRO)		Diesel Fuel			
		Fuel Oil			
		Gasoline			
		Jet Fuel			
		Kerosene			
		Mineral Spirits			
		Motor Oil			
		Total Petroleum Hydrocarbons (TPH		10 000	10 000
SW 846 8015B (TPH GRO)		Gasoline Range Organics (GRO)			
SW 846 8081A	72-54-8	4 4 DDD	0 28	2	0 28
	72-55-9	4 4 DDE	0 2	2	0 2
	50-29-3	4 4 DDT	0 2	2	0 2
	309-00-2	Aldrin	0 004	0 002	0 002
	319-84-6	alpha BHC	0 011	0 0022	0 0022
	5103-71-9	alpha Chlordane	0 19	2	0 19
	959-98-8	alpha Endosulfan	220		220
	319-85-7	beta BHC	0 037	0 0022	0 0022
	33213-65-9	beta Endosulfa	220		220
	12789-03-6	Chlordane	0 19	2	0 19
	319-86-8	delta BHC		0 0022	0 0022
	60-57-1	Dieldrin	0 0042	0 002	0 002
	115-29-7	Endosulfan	220		220
	1031-07-8	Endosulfan Sulfate			
	72-20-8	Endrin	11	2	2
	7421-93-4	Endrin Aldehyde			
	53494-70-5	Endrin Ketone			
	58-89-9	gamma BHC	0 052	0 2	0 052
	5103-74-2	gamma Chlordane	0 19	2	0 19
	76-44-8	Heptachlor	0 015	0 4	0 015
	1024-57-3	Heptachlor Epoxide	0 0074	0 2	0 0074
	72-43-5	Methoxychlor	180	40	40
	8001-35-2	Toxaphene	0 061	3	0 061

Table 4 3
Screening Levels for Water
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA R gion IX PRGs (g/L) (Tap W t)	Miss i CALM (g/L) (G dw t T rg t C)	Scree g Le el (g/L)
SW 846 8082	12674-11 2	PCB 1016	0 96		0 96
	11104-28 2	PCB 1221	0 034		0 034
	11141 16-5	PCB 1232	0 034		0 034
	53469 21 9	PCB 1242	0 034		0 034
	12672 29 6	PCB 1248	0 034		0 034
	11097 69 1	PCB 1254	0 034		0 034
	11096-82 5	PCB 1260	0 034		0 034
	1336-36-3	Total Polychlorinated Biphenyls (PCBs	0 034	0 5	0 034
SW 846 8260B	630-20-6	1 1 1 2 Tetrachloroethane	0 43	70	0 43
	71 55 6	1 1 1 Trichlo oethane	3 200	200	200
	79 34-5	1 1 2 2 Tetrachlo oethane	0 055	0 3	0 055
	79 00 5	1 1 2 Trichlo oethane	0 2	5	0 2
	75 34-3	1 1 Dichloroethane	810		810
	75 35-4	1 1 Dichlo oethene	340	7	7
	563 58 6	1 1 Dichloropropene			
	87 61 6	1 2 3 Trichlorobenzen			
	120-82 1	1 2 4-Trichlorobenze e	190	70	70
	95 63 6	1 2 4-Trim thylbenzene	12		12
	106 93-4	1 2 D b omoethane	0 00076		0 00076
	95 50-1	1 2 Dichlo obenze	370	600	370
	107-06-2	1 2 Dichl roethane	0 12	5	0 12
	78 87 5	1 2 Dichlo opropane	0 16	5	0 16
	108 67 8	1 3 5 Trimethylbenze e	12		12
	541 73 1	1 3 Dichlorobenzene	5 5		5 5
	142 28 9	1 3 Dichlo opropane			
	542 75 6	1 3 Dichlo p ope e	0 4	0 4	0 4
	106-46 7	1 4-Dichlorobenzene	0 5	75	0 5
	594-20-7	2 2 Dichlor p opane			
	78 93 3	2 Buta o e	1 900		1 900
	110-75 8	2 Chloroethyl nyl ether			
	95-49 8	2 Chlo otolu ne	120		120
	591 78 6	2 Hexano e			
	106-43-4	4-Chlorotol ne			
	99 87-6	4-Isopropyltoluene			
	108 10-1	4-Methyl 2 pe tanone	160		160
	67 64-1	Acetone	610		610
	107-02 8	Acrol	0 042		0 042
	107 13 1	Acrylonitrile	0 039	0 06	0 039
	71-43 2	Be ze e	0 34	5	0 34
	108 86-1	B om benzen	20		20
	74-97 5	B omo hlo ometh ne			
	75 25 2	Bromoform	8 5	80	8 5
	74-83 9	Bromom thane	8 7		8 7
	75 15 0	Carbon dis lf d	1 000		1 000
	56 23 5	Carb n tetrachlonde	0 17	5	0 17
	108 90-7	Chlorobe zene	110	100	100
	75 00-3	Chloroethane	4 6		4 6
	67 66-3	Chloroform	6 2	80	6 2
	74-87 3	Chloromethane	1 5		1 5
	156-59 2	c s 1 2 Dichloroeth e	61	70	61

Table 4 3
Screening Levels for Water
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA Reg o IX PRGs (g/L) (Tap Wate)	Misso CALM (g/L) (G o dwate T rget C)	Screening Le el (g/L)
SW 846 8260B (Cont)	10061 01 5	cis 1 3 D chloropropene	0 4	0 4	0 4
	124-48 1	Dibromochloromethane	0 13	80	0 13
	74-95 3	D b omomethane	61		61
	75 27 4	Dichl obromomethane	0 18	80	0 18
	75 71 8	Dichlo odifl o omethane	390		390
	100-41-4	Ethylbenzene	1 300	700	700
	87 68 3	Hexachlorobutadiene	0 86	1	0 86
	98 82 8	Isopropylbenzene	660		660
	1634-04-4	M thyl tertiary butyl ethe	13	20	13
	75 09 2	Methylene chloride	4 3	5	4 3
	91 20-3	Naphthalene	6 2	100	6 2
	104-51 8	n B tylbenze e	240		240
	103 65 1	n Propylbenze e	240		240
	135 98 8	ec Butylbenzene	240		240
	100-42 5	Styre e	1 600	100	100
	98 06-6	tert B tylbenze	240		240
	127 18-4	Tetrachlo oethene	0 66	5	0 66
	108 88 3	Tol e e	720	150	150
	156-60-5	trans 1 2 Dichloroethene	120	100	100
	10061 02 6	trans 1 3 D chloropropene	0 4	0 4	0 4
	79-01 6	Trichlo oeth	0 028	5	0 028
	75 01-4	Vi yl chlo de	0 02	2	0 02
	1330-20-7	Xylenes (Total)	210	320	210
SW 846 8270C	120-82 1	1 2 4-Tri hlo obe e	190	70	70
	95 50-1	1 2 Dichlo obenz e	370	600	370
	122 66-7	1 2 Diphenylhydraz ne	0 084		0 084
	541 73 1	1 3 Dichlo obenzene	5 5		5 5
	106-46-7	1 4-D chlorobenzene	0 5	75	0 5
	95 95-4	2 4 5 Trichloroph l	3 600	2 600	2 600
	88-06-2	2 4 6 Trichlorophenol	3 6	3	3
	120-83 2	2 4-Dichlo oph ol	110	20	20
	105 67 9	2 4-D methylphenol	730	540	540
	51 28 5	2 4-Dinitrophenol	73	70	70
	121 14-2	2 4-Dinitr tol ene	73	0 05	0 05
	606 20-2	2 6-Dinitr tol ne	36	0 05	0 05
	91 58 7	2 Chloronaphthalene	490		490
	95 57 8	2 Chloroph ol	30	40	30
	91 57 6	2 Methyl phth le e			
	95-48 7	2 Methylphenol	1 800		1 800
	88 74-4	2 N troanil ne	1		1
	88 75 5	2 Nitrophenol			
	91 94-1	3 3 Dichlorobenzidin	0 15	0 04	0 04
	99 09 2	3 N tro n line			
	534-52 1	4 6-D nitro 2 Methylphenol			
	101 55 3	4-Brom phe yl phe yl ethe			
	59 50-7	4-Chloro 3 methylphe o			
	106-47 8	4-Chlo o niline	150		150
	7005 72 3	4-Chloroph nyl phenyl ethe			
	106-44-5	4-Methylphenol	180		180
	100-01 6	4-Nitro n l ne			
	100-02 7	4-N trophenol			
	83 32 9	Acenaphthene	370	1 200	370
	208 96 8	Ace aphthyle e			

Table 4 3
Screening Levels for Water
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	Analyte	EPA Region IX PRGs (ug/L) (Tap Water)	Missouri CALM (ug/L) (Groundwater Target Conc)	Screening Level (ug/L)
SW 846 8270C (cont)	120-12 7	Anthracene	1 800	9 600	1 800
	92 87 5	Benzidine	0 00029	0 00012	0 00012
	56-55 3	Benzo(a)anthracen	0 092	0 0044	0 0044
	50-32 8	Benzo(a)pyrene	0 0092	0 2	0 0092
	205 99 2	Benzo(b)fluoranthene	0 092	0 0044	0 0044
	191 24-2	Benzo(g h)perylene			
	207 08 9	Benzo(k)fluoranth e	0 92	0 0044	0 0044
	111 91 1	Bis(2 Chloroethoxy)methane			
	111-44-4	Bis(2 Chloroethyl)ether	0 0098	0 03	0 0098
	108 60 1	Bis(2 Chloro sop opyl)ether	0 27	300	0 27
	117 81 7	Bis(2 Ethylhexyl)phthalate	4 8	6	4 8
	85 68 7	Butyl benzyl phthalate	7 300	3 000	3 000
	86-74 8	Carbazole	3 4		3 4
	218-01 9	Chrysene	9 2	0 0044	0 0044
	53 70-3	Dibenz(a,h) nthrac ne	0 0092	0 0044	0 0044
	132 64-9	Dibenzofuran	24		24
	84-66-2	Diethylphthalate	29 000	23 000	23 000
	131 11 3	Dimethylphthalate	360 000	313 000	313 000
	84-74-2	Di b tylphthal te	3 600	2 700	2 700
	25321 14-6	Dinitrotoluene Mixture	0 099		0 099
	117 84-0	Di n octylphthalate	1 500		1 500
	122 39 4	Diphenylamine	910	200	200
	206-44-0	Fluoranthene	1 500	300	300
	86-73 7	Fluorene	240	1 300	240
	118 74-1	Hexachlorobenzene	0 042	1	0 042
	77-47-4	Hexachlorocyclopentadiene	220	50	50
	67 72 1	Hexachloroethane	4 8	1	1
	193 39 5	Indeno(1 2 3 cd)pyrene	0 092	0 0044	0 0044
	78 59 1	Isophorone	71	100	71
	91 20-3	Naphthalene	6 2	100	6 2
	98 95 3	Nitrobenzene	3 4	17	3 4
	62 75 9	N Nitrosodimethylamine	0 0013	0 0007	0 0007
	86-30-6	N Nitrosodiphenylamine	14	5	5
	621 64-7	N Nitrosodipropylamine	0 0096		0 0096
	87 86-5	Pentachlorophenol	0 56	1	0 56
	85 01 8	Phenanthrene			
	108 95 2	Phenol	22 000	4 000	4 000
	129-00-0	Pyrene	180	960	180

Table 4 3
Screening Levels for Water
St Louis Army Ammunition Plant, St Louis, Missouri

Method	CAS	A alyt	EPA Region IX PRGs (g/L) (Tap Wat)	M ss i CALM (g/L) (Gr dwater T g t C)	S e g Le l (g/L)
SW 846 8290	3268 87 9	1 2 3 4 6 7 8 9 OCDD			
	39001 02 0	1 2 3 4 6 7 8 9 OCDF			
	35822 46 9	1 2 3 4 6 7 8 HpCDD			
	67562 39-4	1 2 3 4 6 7 8 HpCDF			
	39227 28 6	1 2 3 4 7 8 9 HpCDF			
	55673 89 7	1 2 3 4 7 8 HxCDD			
	70648 26 9	1 2 3 4 7 8 HxCDF			
	57653 85 7	1 2 3 6 7 8 HxCDD			
	57117 44-9	1 2 3 6 7 8 HxCDF			
	19408 74-3	1 2 3 7 8 9 HxCDD			
	72918 21 9	1 2 3 7 8 9 HxCDF			
	40321 76-4	1 2 3 7 8 PeCDD			
	57117-41 6	1 2 3 7 8 PeCDF			
	60851 34-5	2 3 4 6 7 8 H CDF			
	57117 31 4	2 3 4 7 8 PeCDF			
	1746-01 6	2 3 7 8 TCDD	0 00000045		0 00000045
	51207 31 9	2 3 7 8 TCDF			
SW 846 8330	99 35-4	1 3 5 Trinitrobenzene	1 100		1 100
	99 65-0	1 3 Dinitrobenzene	3 6	1	1
	118 96-7	2 4 6-Trinitrot lue	2 2	2	2
	121 14-2	2 4-Dinitrotolue e	73	0 05	0 05
	606-20-2	2 6-Dinitrotol ene	36	0 05	0 05
	35572 78 2	2 Amino 4 6 dinitrotolu			
	88 72 2	2 N trotoluene	61		61
	99 08 1	3 Nitrotol n	61		61
	19406-51-0	4-Amino-2 6-dinitrotol e			
	99 99 0	4-Nitrotol ene	61		61
	25321 14-6	Dinitrotoluen Mixtu e	0 099		0 099
	121 82 4	Hexahydro-1 3 5 trinitro 1 3 5 tri	0 61	2	0 61
	479-45 8	Methyl 2 4 6-tri t ophenyln t mi	360		360
	98 95 3	N trobe zene	3 4	17	3 4
	2691 41 0	Octahydro-1 3 5 7 tetran tr 1 3 5 7 t traz e	1 800	400	400
SW 846 9012	74-90-8	Cyanide	6 2	200	6 2
SW 846 9070/9071A		O l and G as			

Notes
ug/L = mic ograms per liter
= No lue establ shed

Table 4 4
Screening Levels for Asbestos, Concrete, Mastic, Product and Surface Wipes
St Louis Army Ammunition Plant, St Louis, Missouri

Sample Media	Method	CAS	Analyte	Screening Level	Source
Solid	600 4 83 043	1332 21 4	Asbestos	1%	AHERA
Concrete	SW 846 8082	1336 36 3	Polychlorinated biphenyls	10 (mg/kg)	CALM
Mastic	SW 846 8082	1336 36 3	Polychlorinated biphenyls	50 (mg/kg)	PCB Megarule
Product	SW 846 8082	1336 36 3	Polychlorinated biphenyls	50 (mg/kg)	PCB Megarule
Surface Wipe	SW 846 8082	1336 36 3	Polychlorinated biphenyls	92 9 (ug/ft^2)	PCB Megarule

Notes

mg/kg = milligrams per kilogram (ppm)

mg/L = milligrams per liter (ppm)

ug/ft^2 = micrograms per square foot

= Screening Level based on standard of 10 ug/100cm^2

AHERA = Asbestos Hazard Emergency Response Act (40 CFR 763)

CALM = Cleanup Levels for Missouri Section 7 3

PCB Megarule = 40 CFR 761 3

Table 4 5
Site Wide Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Concrete										
PCBs (mg/kg)										
Total PCB*	10	17	13	1	10 2	10 2	1 02	76%	6%	02CS 01(0 0 1) 0802
TPH (mg/kg)										
TPH	200	1	1	1	2000	2000	10 00	100%	100%	07CS 01(0 0 1) 0802
Groundwater										
Inorganics (mg/l)										
Fluoride	2 2	3	3		0 44		0 20	100%	0%	03MW 01 0902
Nitrate (NO3)	10	13	11		2 6		0 26	85%	0%	SWMW 04 0902
Semivolatiles (ug/l)										
1 2 Diphenylhydrazine	0 084	13	2	1	0 35	0 35	4 17	15%	8%	08MW 01 0902(J)
Acenaphthene	370	13	3		0 97		0 00	23%	0%	08MW 02 0902(J)
Anthracene	1800	13	11		0 02		0 00	85%	0%	SWMW 02 0902(J)
Benzo(a)anthracene	0 0044	13	13	10	0 066	0 0044	15 00	100%	77%	08MW 02 0902
Benzo(a)pyrene	0 0092	13	13	10	0 092	0 01	10 00	100%	77%	08MW 02 0902
Benzo(b)fluoranthene	0 0044	13	13	12	0 099	0 0054	22 50	100%	92%	08MW 02 0902
Benzo(k)fluoranthene	0 0044	13	13	11	0 19	0 0044	43 18	100%	85%	08MW 02 0902
Bis(2-ethylhexyl)phthalate	4 8	13	4		0 75		0 16	31%	0%	03MW 01 0902(J)
Chrysene	0 0044	13	13	11	0 13	0 0061	29 55	100%	85%	08MW 02 0902
Di n butylphthalate	2700	13	3		0 8		0 00	23%	0%	SWMW 07 0902(J)
Di n octylphthalate	1500	13	2		0 18		0 00	15%	0%	SWMW 02 0902(J)
Dibenz(a,h)anthracene	0 0044	13	13	5	0 077	0 0047	17 50	100%	38%	08MW 02 0902
Diethylphthalate	23000	13	1		0 51		0 00	8%	0%	08MW 01 0902(J)
Fluoranthene	300	13	13		0 34		0 00	100%	0%	08MW 02 0902(J)
Fluorene	240	13	13		0 49		0 00	100%	0%	08MW 02 0902(J)
Indeno(1 2 3 cd)pyrene	0 0044	13	9	5	0 11	0 0066	25 00	69%	38%	08MW 02 0902
Naphthalene	6 2	13	6		0 8		0 13	46%	0%	08MW 02 0902(J)
Pyrene	180	13	13		0 36		0 00	100%	0%	08MW 02 0902(J)
Metals (ug/l)										
Arsenic	0 045	13	13	13	7 8	0 3	173 33	100%	100%	08MW 01 0902
Barium	2000	13	13		410		0 20	100%	0%	SWMW 02 0902
Beryllium	4	13	1		0 8		0 20	8%	0%	SWMW 07 0902(J)
Cadmium	5	13	1		3		0 60	8%	0%	SWMW 07 0902(J)
Copper	1300	13	6		18		0 01	46%	0%	SWMW 07 0902
Lead	15	13	12	1	44	44	2 93	92%	8%	SWMW 07 0902
Nickel	100	13	6		67		0 67	46%	0%	08MW 02 0902
Selenium	50	13	13		14		0 28	100%	0%	02MW 01 0902
Thallium	2	13	1		0 2		0 10	8%	0%	SWMW 07 0902(J)
Zinc	2000	13	4		67		0 03	31%	0%	SWMW 07 0902

Table 4 5
Site Wide Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Volatiles (ug/l)										
1 1 1 Trichloroethane	200	13	1		12		0 06	8%	0%	02MW 01 0902
1 1 Dichloroethane (1 1 DCA)	810	13	2		65		0 08	15%	0%	02MW 01 0902
1 1 Dichloroethene (1 1 DCE)	7	13	1	1	34	34	4 86	8%	8%	02MW 01 0902
1 2 Dichloroethane	0 12	13	1	1	0 4	0 4	3 33	8%	8%	02MW 01 0902
Carbon tetrachloride (CT)	0 17	13	1	1	1	1	5 88	8%	8%	02MW 01 0902
Chloroform	6 2	13	1	1	10	10	1 61	8%	8%	02MW 01 0902
Toluene	150	13	2		0 6		0 00	15%	0%	08MW 01 0902(J)
Mastic										
PCBs (mg/kg)										
Total PCB*	50	6	6		14 9		0 30	100%	0%	06MC 01 0902
Product										
PCBs (mg/kg)										
Total PCB	50	2	1		10		0 20	50%	0%	02PD 01 0802
Sediment										
Dioxins (pg/g)										
2 3 7 8 TCDD	3 9	1	1	1	390	390	100 00	100%	100%	SRSD 02 0503
Dioxin TEQ	3 9	1	1	1	2180 28	2180 28	559 05	100%	100%	SRSD 02 0503
PCBs (mg/kg)										
PCB 1248	0 22	6	6	6	48	3 2	218 18	100%	100%	SRSD 02 0802
PCB 1260	0 22	6	4	3	1 8	0 34	8 18	67%	50%	02SD 01 0802(J)
Total PCB	0 22	6	6	6	49 4	3 54	224 55	100%	100%	SRSD 02 0802
Semivolatiles (mg/kg)										
2 4 Dimethylphenol	1200	4	1		0 2		0 00	25%	0%	SRSD 03 0802(J)
3 3 Dichlorobenzidine	1 1	4	1		0 052		0 05	25%	0%	06SD 01 0902(J)
Acenaphthene	1700	4	4		16		0 01	100%	0%	SRSD 04 0802
Acenaphthylene	0 0305	4	2	1	0 59	0 59	19 34	50%	25%	SRSD 04 0802(J)
Anthracene	8500	4	4		22		0 00	100%	0%	SRSD 04 0802
Benzo(a)anthracene	0 887	4	4	2	80	2 1	90 19	100%	50%	SRSD 04 0802
Benzo(a)pyrene	0 735	4	4	3	66	0 94	89 80	100%	75%	SRSD 04 0802
Benzo(b)fluoranthene	0 626	4	3	2	100	2 6	159 74	75%	50%	SRSD 04 0802
Benzo(g h i)perylene	0 478	4	3	2	44	2 2	92 05	75%	50%	SRSD 04 0802
Benzo(k)fluoranthene	6 2	4	3	1	40	40	6 45	75%	25%	SRSD 04 0802
Bis(2-ethylhexyl)phthalate	35	4	3		9 7		0 28	75%	0%	SRSD 04 0802
Butyl benzyl phthalate	930	4	2		0 86		0 00	50%	0%	SRSD 03 0802(J)
Chrysene	36	4	4	1	88	88	2 44	100%	25%	SRSD 04 0802
Di n butylphthalate	2300	4	1		0 68		0 00	25%	0%	SRSD 04 0802(J)
Di n octylphthalate	0 3	4	2	1	2	2	6 67	50%	25%	SRSD 02 0802(J)
Dibenz(a,h)anthracene	0 303	4	2	1	11	11	36 30	50%	25%	SRSD 04 0802
Diethylphthalate	2000	4	1		4 1		0 00	25%	0%	SRSD 04 0802(J)

Table 4 5
Site Wide Data Summary
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Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Fluoranthene	1600	4	4		260		0 16	100%	0%	SRSD 04 0802
Fluorene	1100	4	2		14		0 01	50%	0%	SRSD 04 0802
Indeno(1 2 3 cd)pyrene	0 62	4	3	2	37	1 6	59 68	75%	50%	SRSD 04 0802
Naphthalene	56	4	3		7 3		0 13	75%	0%	SRSD 02 0802(J)
Pentachlorophenol	3	4	1		0 016		0 01	25%	0%	06SD 01 0902(J)
Phenanthrene	1 04	4	4	3	190	5 4	182 69	100%	75%	SRSD 04 0802
Pyrene	2100	4	4		170		0 08	100%	0%	SRSD 04 0802
Metals (mg/kg)										
Antimony	31	6	5	5	66	39	2 13	83%	83%	06SD 01 0902
Arsenic	13 2	6	6	4	31	23	2 35	100%	67%	02SD 01 0802
Barium	5400	6	6		256		0 05	100%	0%	06SD 01 0902
Beryllium	1 01	6	5		0 6		0 59	83%	0%	02SD 02 0802
Cadmium	37	6	5		17		0 46	83%	0%	SRSD 02 0802
Chromium	210	6	6	4	360	215	1 71	100%	67%	SRSD 02 0802
Copper	1100	6	6	1	1290	1290	1 17	100%	17%	SRSD 03 0802
Lead	363	6	6	3	3660	424	10 08	100%	50%	SRSD 04 0802
Mercury	0 6	6	6	2	5 24	3 6	8 73	100%	33%	SRSD 02 0802
Nickel	1600	6	6		540		0 34	100%	0%	SRSD 02 0802
Selenium	300	6	5		115		0 38	83%	0%	SRSD 02 0802
Silver	140	6	5		17		0 12	83%	0%	SRSD 02 0802
Thallium	5 2	6	3		0 24		0 05	50%	0%	02SD 02 0802(J)
Zinc	23000	6	6		10300		0 45	100%	0%	06SD 01 0902
TPH (mg/kg)										
TPH*	200	7	6	5	37060	6340	185 30	86%	71%	SRSD 02 0802
Volatiles (mg/kg)										
1 1 1 Trichloroethane	1200	6	4	1	3900	3900	3 25	67%	17%	02SD 02 0802
1 1 2 Trichloroethane	0 73	6	1		0 04		0 05	17%	0%	SRSD 02 0802(J)
1 1 Dichloroethane (1 1 DCA)	510	6	5	1	640	640	1 25	83%	17%	02SD 02 0802
1 1 Dichloroethene (1 1 DCE)	0 4	6	1		0 083		0 21	17%	0%	SRSD 02 0802
1 2 4 Trichlorobenzene	270	6	2		0 2		0 00	33%	0%	SRSD 04 0802(J)
1 2 Dichlorobenzene	370	6	2		1 4		0 00	33%	0%	SRSD 02 0802(J)
1 2 Dichloroethane	0 28	6	4	1	0 98	0 98	3 50	67%	17%	02SD 02 0802
1 2 Dichloropropane	0 34	6	1		0 06		0 18	17%	0%	02SD 02 0802(J)
1 3 Dichlorobenzene	16	6	1		0 038		0 00	17%	0%	SRSD 02 0802(J)
1 4 Dichlorobenzene	3 4	6	3		2 9		0 85	50%	0%	SRSD 04 0802
Benzene	0 6	6	3		0 087		0 14	50%	0%	02SD 02 0802
Bromomethane	3 9	6	1		0 043		0 01	17%	0%	02SD 01 0802(J)
Chloroethane	3	6	5	2	36	3	12 00	83%	33%	SRSD 02 0802
Chloroform	0 8	6	1		0 39		0 49	17%	0%	02SD 02 0802
Chloromethane	1 2	6	1		0 4		0 33	17%	0%	02SD 02 0802
Ethylbenzene	8 9	6	5		0 6		0 07	83%	0%	02SD 02 0802

Table 4 5
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Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Hexachlorobutadiene	6 2	6	1		0 081		0 01	17%	0%	SRSD 02 0802
Methylene chloride	9 1	6	1	1	22	?2	2 42	17%	17%	02SD 02 0802(J)
Naphthalene	56	6	5		6 4		0 11	83%	0%	SRSD 02 0802
Tetrachloroethene (PERC)	1 5	6	4		0 89		0 59	67%	0%	02SD 02 0802
Toluene	520	6	6		1 6		0 00	100%	0%	SRSD 02 0802
Trichloroethene (TCE)	0 053	6	4	2	0 52	0 13	9 81	67%	33%	02SD 02 0802
Vinyl chloride (VC)	0 079	6	1	1	0 13	0 13	1 65	17%	17%	SRSD 02 0802
Xylenes (Total)	270	6	5		3 3		0 01	83%	0%	02SD 02 0802
Soil										
Dioxins (pg/g)										
2 3 7 8 TCDD	3 9	92	20	4	15 9	4 3	4 08	22%	4%	02SB 03(0 0 5) 0902 RE
Dioxin TEQ	3 9	70	70	29	303 9815	3 91204	77 94	100%	41%	02SB 01(09 10) 0902
PCBs (mg/kg)										
PCB 1242	0 22	634	1		0 059		0 27	0%	0%	02TS 04(0 0 5) 0802(J)
PCB 1248	0 22	634	46	5	14	1	63 64	7%	1%	RA 02SB 01(0 0 5) 0902
PCB 1254	0 22	638	19	2	0 35	0 34	1 59	3%	0%	01SB 10(0 0 5) 0802
PCB 1260	0 22	634	9		0 17		0 77	1%	0%	RA 08SB 20(0 0 5) 0902(J)
Total PCB	0 22	638	73	7	14	0 34	63 64	11%	1%	RA 02SB 01(0 0 5) 0902
Pesticides (mg/kg)										
4 4 DDD	2 4	87	2		0 0078		0 00	2%	0%	RA 06SB 06(0 0 5) 0902(J)
4 4 DDE	1 7	87	44	1	65	65	38 24	51%	1%	RA 05SB 05(0 0 5) 0902(J)
4 4 DDT	1 7	88	54	3	1100	4	647 06	61%	3%	RA 05SB 05(0 0 5) 0902(J)
Aldrin	0 029	87	1		0 0006		0 02	1%	0%	RA 05SB 06(0-0 5) 0902(J)
gamma BHC	0 44	87	1		0 0005		0 00	1%	0%	RA 06SB 14(0 0 5) 0902(J)
Semivolatiles (mg/kg)										
1 2 Diphenylhydrazine	0 61	91	44		0 012		0 02	48%	0%	SRSB 34(23 24) 0902(J)
2 4 6 Trichlorophenol	6 1	112	1		0 072		0 01	1%	0%	SRSB 19(10 11) 0902(J)
2 4 Dinitrotoluene (2 4 DNT)	2	112	1		0 004		0 00	1%	0%	SRSB 33(08 09) 0802(J)
3 3 Dichlorobenzidine	1 1	112	2		0 047		0 04	2%	0%	SRSB 16(06 07) 0902(J)
Acenaphthene	1700	533	173		2		0 00	32%	0%	RA 05SB 05(0 0 5) 0902(J)
Acenaphthylene	0 0305	534	56	3	0 096	0 049	3 15	10%	1%	RA 08SB 16(04 05) 0902(J)
Anthracene	8500	533	230		6		0 00	43%	0%	RA 05SB 05(0 0 5) 0902(J)
Benzo(a)anthracene	0 887	540	264	14	25	0 9	28 18	49%	3%	RA 05SB 05(0 0 5) 0902(J)
Benzo(a)pyrene	0 735	540	258	14	19	0 77	25 85	48%	3%	RA 05SB 05(0 0 5) 0902(J)
Benzo(b)fluoranthene	0 626	540	270	18	16	0 7	25 56	50%	3%	RA 05SB 05(0 0 5) 0902(J)
Benzo(g h i)perylene	0 478	536	215	15	14	0 5	29 29	40%	3%	RA 05SB 05(0 0 5) 0902(J)
Benzo(k)fluoranthene	6 2	533	271	1	19	19	3 06	51%	0%	RA 05SB 05(0 0 5) 0902(J)
Bis(2-ethylhexyl)phthalate	35	112	64		0 17		0 00	57%	0%	SRSB 07(21 22) 0802(J)
Butyl benzyl phthalate	930	112	49		0 085		0 00	44%	0%	SRSB 18(14 15) 0902(J)
Chrysene	36	533	308		22		0 61	58%	0%	RA 05SB 05(0 0 5) 0902(J)

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Di n butylphthalate	2300	111	52		0 36		0 00	47%	0%	SRSB 07(16 17) 0802
Di n octylphthalate	0 3	112	15		0 027		0 09	13%	0%	SRSB 16(06 07) 0902(J)
Dibenz(a,h)anthracene	0 303	535	117	2	7 1	0 36	23 43	22%	0%	RA 05SB 05(0 0 5) 0902(J)
Dibenzofuran	110	21	1		0 43		0 00	5%	0%	SRSB 39(10 11) 0503
Diethylphthalate	2000	112	42		0 012		0 00	38%	0%	SRSB 19(06 07) 0902(J)
Dimethylphthalate	1360	112	24		0 004		0 00	21%	0%	SRSB 21(07 08) 0802(J)
Fluoranthene	1600	526	384		54		0 03	73%	0%	RA 05SB 05(0 0 5) 0902(J)
Fluorene	1100	533	147		2 1		0 00	28%	0%	RA 05SB 05(0 0 5) 0902(J)
Hexachlorobenzene	0 3	112	1		0 002		0 01	1%	0%	SRSB 17(19 20) 0902(J)
Indeno(1 2 3 cd)pyrene	0 62	537	240	10	11	0 62	17 74	45%	2%	RA 05SB 05(0 0 5) 0902(J)
Isophorone	510	102	8		0 01		0 00	8%	0%	SRSB 02(16 17) 0802(J)
N Nitrosodiphenylamine	99	112	3		0 021		0 00	3%	0%	SRSB 18(14 15) 0902(J)
Naphthalene	56	533	63		0 56		0 01	12%	0%	RA 05SB 05(0 0 5) 0902(J)
Pentachlorophenol	3	112	1		0 003		0 00	1%	0%	SRSB 06(16 17) 0802(J)
Phenanthrene	1 04	540	339	17	33	1 1	31 73	63%	3%	RA 05SB 05(0 0 5) 0902(J)
Phenol	5200	112	1		0 002		0 00	1%	0%	SRSB 31(25 26) 0902(J)
Pyrene	2100	533	392		44		0 02	74%	0%	RA 05SB 05(0 0 5) 0902(J)
Metals (mg/kg)										
Antimony	31	586	273	1	34	34	1 10	47%	0%	RA RDSB 16E(0 0 5) 0802
Arsenic	13 2	584	583	2	20 6	14	1 56	100%	0%	SRSB 35(24 25) 0503
Barium	5400	566	566		713		0 13	100%	0%	SRSB 09(18 19) 0802
Beryllium	1 01	583	583	40	6 7	1 1	6 63	100%	7%	RA RDSB 06E(0 0 5) 0802
Cadmium	37	583	291		4 2		0 11	50%	0%	RA 06SB 05(0 0 5) 0902
Chromium	210	583	583		151		0 72	100%	0%	RA 05SB 05(0 0 5) 0902
Copper	1100	583	582	1	1260	1260	1 15	100%	0%	RA 01SB 03(0 0 5) 0802
Lead	363	583	522	3	1790	721	4 93	90%	1%	RA 05SB 05(0 0 5) 0902
Mercury	0 6	584	496	4	1 5	0 85	2 50	85%	1%	RA 06SB 02(0 0 5) 0902
Nickel	1600	583	583		60		0 04	100%	0%	SRSB 09(18 19) 0802
Selenium	300	583	123		45		0 15	21%	0%	SRSB 03(16 17) 0802
Silver	140	583	5		4 2		0 03	1%	0%	RA 02SB 07(0 0 5) 0902(J) RA RDSB 09E(09 10) 0802(J)
Thallium	5 2	583	483		3		0 58	83%	0%	SRSB 35(24 25) 0503
Zinc	23000	583	583		880		0 04	100%	0%	RA 05SB 05(0 0 5) 0902
TPH (mg/kg)										
TPH	200	224	91	11	3603 2	250	18 02	41%	5%	02SB 04(04 05) 0902
Volatiles (mg/kg)										
1 1 1 Trichloroethane	1200	547	16		0 58		0 00	3%	0%	02TS 02(0 0 5) 080?
1 1 Dichloroethane (1 1 DCA)	510	547	9		0 19		0 00	2%	0%	RA RDSB 01E(09 10) 0802(J)
1 1 Dichloroethene (1 1 DCE)	0 4	554	8		0 17		0 42	1%	0%	RA 08SB 05(0 0 5) 0902
1 2 4 Trichlorobenzene	270	547	1		0 034		0 00	0%	0%	RA 06SB 01(0 0 5) 0902(J)
1 2 4 Trimethylbenzene	52	21	1		0 0029		0 00	5%	0%	SRSB 39(10 11) 0503(J)

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1 2 Dichlorobenzene	370	547	3		0 2		0 00	1%	0%	02TS 05(02 03) 0902
1 2 Dichloroethane	0 28	547	17		0 044		0 16	3%	0%	RA RRSB 10(0 0 5) 0802(J)
1 2 Dichloropropane	0 34	547	1		0 034		0 10	0%	0%	RA RRSB 10(0 0 5) 0802(J)
1 3 5 Trimethylbenzene	21	21	1		0 00089		0 00	5%	0%	SRSB 39(10 11) 0503(J)
1 3 Dichlorobenzene	16	547	2		0 029		0 00	0%	0%	RA RRSB 10(0 0 5) 0802(J)
1 4 Dichlorobenzene	3 4	547	3		0 016		0 00	1%	0%	RA NESB 03(0 0 5) 0802(J)
Benzene	0 6	564	4		0 034		0 06	1%	0%	RA RRSB 10(0 0 5) 0802(J)
Bromomethane	3 9	547	6		0 05		0 01	1%	0%	SRSB 05(25 26) 0802(J)
Carbon disulfide	360	21	6		0 003		0 00	29%	0%	SRSB 39(15 16) 0503(J)
Chloroethane	3	547	1		0 26		0 09	0%	0%	RA RDSB 01E(09 10) 0802(J)
Chloroform	0 8	547	5		0 041		0 05	1%	0%	RA RRSB 10(0 0 5) 0802(J)
Chloromethane	1 2	547	4		0 042		0 04	1%	0%	RA RRSB 06(0 0 5) 0802(J)
Ethylbenzene	8 9	564	63		0 032		0 00	11%	0%	02TS 05(02 03) 0902(J)
Hexachlorobutadiene	6 2	547	4		0 47		0 08	1%	0%	02TS 04(0 0 5) 0802
Methylene chloride	9 1	547	7		0 17		0 02	1%	0%	SRSB 33(12 13) 0802(J)
Naphthalene	56	547	12		2 3		0 04	2%	0%	02TS 05(02 03) 0902
sec Butylbenzene	220	21	1		0 00045		0 00	5%	0%	SRSB 41(17 18) 0503(J)
Styrene	1500	21	1		0 00051		0 00	5%	0%	SRSB 41(17 18) 0503(J)
Tetrachloroethene (PERC)	1 5	547	2		0 0043		0 00	0%	0%	SRSB 39(10 11) 0503(J)
Toluene	520	564	59		0 62		0 00	10%	0%	RA 04SB 03(04 05) 0902
Trichloroethene (TCE)	0 053	547	2		0 041		0 77	0%	0%	RA RDSB 10(0 0 5) 0802(J)
Xylenes (Total)	270	564	9		0 18		0 00	2%	0%	10SB 03(0 0 5) 0902(J)
Surface Wipe										
PCBs (ug/ft2)										
Total PCB	92 9	10	10		73		0 79	100%	0%	06SW 03 0902
Tap Water										
Inorganics (mg/l)										
Fluoride	2 2	1	1		1		0 45	100%	0%	FIRE HYDRANT
Wastewater										
PCBs (ug/l)										
PCB 1248	0 034	10	10	10	6 8	0 13	200 00	100%	100%	SRWW 04 0802
Total PCB	0 034	10	10	10	6 8	0 13	200 00	100%	100%	SRWW 04 0802
Semivolatiles (ug/l)										
1 2 Diphenylhydrazine	0 084	8	2		0 071		0 85	25%	0%	SRWW 02 0802(J)
Acenaphthene	370	8	5		1		0 00	63%	0%	SRWW 04 0802(J)
Anthracene	1800	8	5		3		0 00	63%	0%	SRWW 04 0802(J)
Benzidine	0 00012	8	1	1	2 3	2 3	19166 67	13%	13%	SRWW 10 0802
Benzo(a)anthracene	0 0044	8	7	7	9 7	0 079	2204 55	88%	88%	SRWW 04 0802
Benzo(a)pyrene	0 0092	8	6	6	9 2	0 13	1000 00	75%	75%	SRWW 04 0802
Benzo(b)fluoranthene	0 0044	8	7	7	12	0 11	2727 27	88%	88%	SRWW 04 0802

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Benzo(k)fluoranthene	0 0044	8	7	7	5 8	0 092	1318 18	88%	88%	SRWW 04 0802
Bis(2-ethylhexyl)phthalate	4 8	8	8		3 3		0 69	100%	0%	SRWW 01 0802(J)
Butyl benzyl phthalate	3000	8	1		0 82		0 00	13%	0%	SRWW 01 0802(J)
Chrysene	0 0044	8	7	7	13	0 079	2954 55	88%	88%	SRWW 04 0802
Di n butylphthalate	2700	8	8		0 71		0 00	100%	0%	SRWW 04 0802(J) SRWW 07 0802(J)
Di n octylphthalate	1500	8	1		0 097		0 00	13%	0%	SRWW 04 0802(J)
Dibenz(a,h)anthracene	0 0044	8	4	4	1 8	0 21	409 09	50%	50%	SRWW 04 0802
Fluoranthene	300	8	8		22		0 07	100%	0%	SRWW 04 0802
Fluorene	240	8	6		0 92		0 00	75%	0%	SRWW 04 0802(J)
Indeno(1 2 3 cd)pyrene	0 0044	8	6	6	8 8	0 08	2000 00	75%	75%	SRWW 04 0802
Naphthalene	6 2	8	2		0 2		0 03	25%	0%	SRWW 04 0802(J)
Pentachlorophenol	0 56	8	1		0 058		0 10	13%	0%	SRWW 06 0802(J)
Pyrene	180	8	8		20		0 11	100%	0%	SRWW 04 0802
Metals (ug/l)										
Antimony	6	10	10		1 4		0 23	100%	0%	02WW 01 0802
Arsenic	0 045	10	10	10	3 2	0 9	71 11	100%	100%	02WW 02 0802
Barium	2000	10	10		130		0 07	100%	0%	SRWW 07 0802
Beryllium	4	10	3		1		0 25	30%	0%	02WW 01 0802
Cadmium	5	10	1	1	19	19	3 80	10%	10%	02WW 02 0802
Chromium	100	10	5		13		0 13	50%	0%	02WW 01 0802(J)
Copper	1300	10	10		140		0 11	100%	0%	02WW 01 0802
Lead	15	10	10	8	412	15	27 47	100%	80%	02WW 01 0802
Nickel	100	10	2		31		0 31	20%	0%	02WW 01 0802
Selenium	50	10	10		16		0 32	100%	0%	SRWW 10 0802
Silver	100	10	3		5		0 05	30%	0%	SRWW 06 0802(J)
Thallium	2	10	1		0 09		0 04	10%	0%	02WW 01 0802(J)
Zinc	2000	10	10		1420		0 71	100%	0%	02WW 02 0802
TPH (ug/l)										
TPH*	10000	10	4		53		0 01	40%	0%	SRWW 11 0802
Volatiles (ug/l)										
1 1 1 Trichloroethane	200	10	5	1	340	340	1 70	50%	10%	02WW 02 0802
1 1 Dichloroethane (1 1 DCA)	810	10	5		390		0 48	50%	0%	02WW 02 0802
1 1 Dichloroethene (1 1 DCE)	7	10	3		2 1		0 30	30%	0%	SRWW 03 0802
1 2 4 Trichlorobenzene	70	10	2		1 2		0 02	20%	0%	SRWW 06 0802(J)
1 2 Dichloroethane	0 12	10	2	2	1 2	0 4	10 00	20%	20%	02WW 02 0802
1 4 Dichlorobenzene	0 5	10	1	1	1 2	1 2	2 40	10%	10%	SRWW 04 0802
Carbon tetrachloride (CT)	0 17	10	1	1	2 1	2 1	12 35	10%	10%	SRWW 06 0802
Chloroethane	4 6	10	4	3	150	38	32 61	40%	30%	SRWW 02 0802
Chloroform	6 2	10	1		0 3		0 05	10%	0%	SRWW 06 0802(J)
Ethylbenzene	2 9	10	1		0 8		0 28	10%	0%	SRWW 11 0802(J)

Table 4 5
Site Wide Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Methylene chloride	4 3	10	1	1	49	49	11 40	10%	10%	02WW 02 0802
Tetrachloroethene (PERC)	0 66	10	1		0 3		0 45	10%	0%	02WW 01 0802(J)
Toluene	150	10	2		0 2		0 00	20%	0%	02WW 01 0802(J) SRWW 11 0802(J)
Trichloroethene (TCE)	0 028	10	1	1	10	10	357 14	10%	10%	SRWW 11 0802
Vinyl chloride (VC)	0 02	10	1	1	0 5	0 5	25 00	10%	10%	02WW 02 0802(J)
Xylenes (Total)	210	10	2		4		0 02	20%	0%	SRWW 11 0802

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4-4)

Table 4 6
Building 1 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Concrete										
PCBs (mg/kg)										
Total PCB	10	2	1		0 43		0 04	50%	0%	01CS 01(0 0 1) 0802
Soil										
PCBs (mg/kg)										
PCB 1248	0 22	51	4		0 058		0 26	8%	0%	01SB 11(09 10) 0802(J)
PCB 1254	0 22	54	3	1	0 35	0 35	1 59	6%	2%	01SB 10(0 0 5) 0802
PCB 1260	0 22	51	3		0 014		0 06	6%	0%	RA 01SB 03(0 0 5) 0802(J)
Total PCB	0 22	54	9	1	0 35	0 35	1 59	17%	2%	01SB 10(0 0 5) 0802
Semivolatiles (mg/kg)										
Acenaphthene	1700	33	19		0 14		0 00	58%	0%	RA 01SB 03(0 0 5) 0802(J)
Acenaphthylene	0 0305	33	2		0 01		0 33	6%	0%	RA 01SB 10(04 05) 0802(J)
Anthracene	8500	33	22		0 5		0 00	67%	0%	RA 01SB 03(0-0 5) 0802
Benzo(a)anthracene	0 887	33	23	1	1 7	1 7	1 92	70%	3%	RA 01SB 03(0 0 5) 0802
Benzo(a)pyrene	0 735	33	16	1	1 2	1 2	1 63	48%	3%	RA 01SB 03(0 0 5) 0802
Benzo(b)fluoranthene	0 626	33	18	2	1 7	0 7	2 72	55%	6%	RA 01SB 03(0 0 5) 0802
Benzo(g h i)perylene	0 478	33	15	1	0 81	0 81	1 69	45%	3%	RA 01SB 03(0 0 5) 0802
Benzo(k)fluoranthene	6 2	33	18		0 96		0 15	55%	0%	RA 01SB 03(0 0 5) 0802
Chrysene	36	33	25		1 8		0 05	76%	0%	RA 01SB 03(0 0 5) 0802
Dibenz(a,h)anthracene	0 303	33	5		0 29		0 96	15%	0%	RA 01SB 03(0 0 5) 0802(J)
Fluoranthene	1600	33	26		4 3		0 00	79%	0%	RA 01SB 03(0 0 5) 0802
Fluorene	1100	33	16		0 15		0 00	48%	0%	RA 01SB 03(0 0 5) 0802(J)
Indeno(1 2 3 cd)pyrene	0 62	33	17	1	0 7	0 7	1 13	52%	3%	RA 01SB 03(0 0 5) 0802
Naphthalene	56	33	13		0 022		0 00	39%	0%	RA 01SB 04(0 0 5) 0802(J)
Phenanthrene	1 04	33	26	2	2 8	1 7	2 69	79%	6%	RA 01SB 03(0 0 5) 0802
Pyrene	2100	33	26		3 2		0 00	79%	0%	RA 01SB 03(0 0 5) 0802
Metals (mg/kg)										
Antimony	31	69	4		7		0 23	6%	0%	RA 01SB 03(0 0 5) 0802(J)
Arsenic	13 2	70	70	1	14	14	1 06	100%	1%	01SB 15(0 0 5) 0802
Barium	5400	69	69		268		0 05	100%	0%	01SB 15(09 10) 0802
Beryllium	1 01	69	69		0 8		0 79	100%	0%	01SB 04(04 05) 0802
Cadmium	37	69	24		2 3		0 06	35%	0%	RA 01SB 10(0 0 5) 0802
Chromium	210	69	69		46		0 22	100%	0%	RA 01SB 03(0 0 5) 0802
Copper	1100	69	69	1	1260	1260	1 15	100%	1%	RA 01SB 03(0 0 5) 0802
Lead	363	69	57		236		0 65	83%	0%	RA 01SB 03(0 0 5) 0802
Mercury	0 6	69	63		0 098		0 16	91%	0%	RA 01SB 10(04 05) 0802(J)
Nickel	1600	69	69		48		0 03	100%	0%	RA 01SB 03(0 0 5) 0802
Selenium	300	69	17		24		0 08	25%	0%	RA 01SB 07(0 0 5) 0802
Thallium	5 2	69	60		0 32		0 06	87%	0%	01SB 15(04-05) 0802(J)

Table 4 6
Building 1 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Zinc	23000	69	69		311		0 01	100%	0%	RA 01SB 03(0 0 5) 0802
TPH (mg/kg)										
TPH	200	15	6		26		0 13	40%	0%	01SB 08(0 0 5) 0902
Volatiles (mg/kg)										
1 2 Dichloroethane	0 28	33	1		0 009		0 03	3%	0%	RA 01SB 06(04 05) 0802(J)
Naphthalene	56	33	1		0 049		0 00	3%	0%	RA 01SB 06(0 0 5) 0802(J)
Toluene	520	33	1		0 01		0 00	3%	0%	RA 01SB 07(0 0 5) 0802(J)

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 7
Building 2 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Concrete										
PCBs (mg/kg)										
Total PCB	10	10	10	1	10 2	10 2	1 02	100%	10%	02CS 01(0 0 1) 0802
Product										
PCBs (mg/kg)										
Total PCB	50	2	1		10		0 20	50%	0%	02PD 01 0802
Soil										
Dioxins (pg/g)										
2 3 7 8 TCDD	3 9	92	20	4	15 9	4 3	4 08	22%	4%	02SB 03(0 0 5) 0902 RE
Dioxin TEQ	3 9	70	70	29	304	3 914	77 94	100%	41%	02SB 01(09 10) 0902
PCBs (mg/kg)										
PCB 1242	0 22	110	1		0 059		0 27	1%	0%	02TS 04(0 0 5) 0802(J)
PCB 1248	0 22	110	34	5	14	1	63 64	31%	5%	RA 02SB 01(0 0 5) 0902
PCB 1254	0 22	110	3		0 033		0 15	3%	0%	RA 02SB 07(0 0 5) 0902(J)
PCB 1260	0 22	110	1		0 023		0 10	1%	0%	02TS 09(0 0 5) 0802(J)
Total PCB	0 22	110	38	5	14	1 023	63 64	35%	5%	RA 02SB 01(0 0 5) 0902
Semivolatiles (mg/kg)										
Acenaphthene	1700	36	5		0 004		0 00	14%	0%	RA 02SB 06(0 0 5) 0902(J)
Acenaphthylene	0 0305	36	1		0 001		0 03	3%	0%	RA 02SB 02(09 10) 0902(J)
Anthracene	8500	36	14		0 031		0 00	39%	0%	RA 02SB 11(09 10) 0902(J)
Benzo(a)anthracene	0 887	36	17		0 26		0 29	47%	0%	RA 02SB 11(09 10) 0902(J)
Benzo(a)pyrene	0 735	36	12		0 17		0 23	33%	0%	RA 02SB 11(09 10) 0902
Benzo(b)fluoranthene	0 626	36	13		0 22		0 35	36%	0%	RA 02SB 11(09 10) 0902(J)
Benzo(g h i)perylene	0 478	36	9		0 066		0 14	25%	0%	RA 02SB 11(09 10) 0902
Benzo(k)fluoranthene	6 2	36	16		0 11		0 02	44%	0%	RA 02SB 11(09 10) 0902(J)
Chrysene	36	36	21		0 23		0 01	58%	0%	RA 02SB 11(09 10) 0902(J)
Dibenz(a,h)anthracene	0 303	36	1		0 025		0 08	3%	0%	RA 02SB 11(09 10) 0902(J)
Fluoranthene	1600	36	28		0 28		0 00	78%	0%	RA 02SB 11(09 10) 0902(J)
Fluorene	1100	36	5		0 005		0 00	14%	0%	RA 02SB 11(09 10) 0902(J)
Indeno(1 2 3 cd)pyrene	0 62	36	13		0 063		0 10	36%	0%	RA 02SB 11(09 10) 0902(J)
Naphthalene	56	36	2		0 002		0 00	6%	0%	RA 02SB 06(0 0 5) 0902(J)
Phenanthrene	1 04	36	25		0 059		0 06	69%	0%	RA 02SB 06(0 0 5) 0902(J)
Pyrene	2100	36	27		0 24		0 00	75%	0%	RA 02SB 11(09 10) 0902(J)
Metals (mg/kg)										
Antimony	31	56	46		11		0 35	82%	0%	02TS 02(04 05) 0802(J)
Arsenic	13 2	56	56		9 1		0 69	100%	0%	02TS 06(0 0 5) 0902
Barium	5400	56	56		235		0 04	100%	0%	02TS 03(0 0 5) 0802
Beryllium	1 01	56	56	1	1 2	1 2	1 19	100%	2%	02TS 01(12 13) 0902

Table 4 7
Building 2 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Cadmium	37	56	43		2 4		0 06	77%	0%	02TS 01(12 13) 0902
										RA 02SB 02(04 05) 0902
										RA 02SB 09(0 0 5) 0902
Chromium	210	56	56		31		0 15	100%	0%	02TS 01(17 18) 0902
Copper	1100	56	56		21		0 02	100%	0%	02TS 02(0 0 5) 0802
Lead	363	56	56	1	721	721	1 99	100%	2%	RA 02SB 01(0 0 5) 0902
Mercury	0 6	56	53		0 35		0 58	95%	0%	02TS 09(0 0 5) 0802
Nickel	1600	56	56		23		0 01	100%	0%	02TS 03(0 0 5) 0802
										02TS 04(04 05) 0802
										RA 02SB 04(0 0 5) 0902
										RA 02SB 09(04 05) 0902
Selenium	300	56	5		13		0 04	9%	0%	RA 02SB 04(09 10) 0902(J)
Silver	140	56	2		4 2		0 03	4%	0%	RA 02SB 07(0 0 5) 0902(J)
Thallium	5 2	56	56		0 5		0 10	100%	0%	RA 02SB 07(04 05) 0902(J)
Zinc	23000	56	56		81		0 00	100%	0%	RA 02SB 09(0 0 5) 0902
TPH (mg/kg)										
TPH	200	32	26	7	3603 2	250	18 02	81%	22%	02SB 04(04 05) 0902
Volatiles (mg/kg)										
1 1 1 Trichloroethane	1200	56	5		0 58		0 00	9%	0%	02TS 02(0-0 5) 0802
1 1 Dichloroethane (1 1 DCA)	510	56	3		0 11		0 00	5%	0%	RA 02SB 12(09 10) 0902
1 1 Dichloroethene (1 1 DCE)	0 4	56	2		0 11		0 27	4%	0%	RA 02SB 12(09 10) 0902
1 2 Dichlorobenzene	370	56	2		0 2		0 00	4%	0%	02TS 05(02 03) 0902
1 2 Dichloroethane	0 28	56	2		0 012		0 04	4%	0%	02TS 04(0 0 5) 0802(J)
Chloroform	0 8	56	1		0 006		0 01	2%	0%	02TS 04(0 0 5) 0802(J)
Chloromethane	1 2	56	1		0 03		0 03	2%	0%	02TS 04(0 0 5) 0802(J)
Ethylbenzene	8 9	56	6		0 032		0 00	11%	0%	02TS 05(02 03) 0902(J)
Hexachlorobutadiene	6 2	56	1		0 47		0 08	2%	0%	02TS 04(0 0 5) 0802
Naphthalene	56	56	3		2 3		0 04	5%	0%	02TS 05(02 03) 0902
Xylenes (Total)	270	56	1		0 063		0 00	2%	0%	02TS 05(02 03) 0902

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 8
Building 4 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Concrete										
PCBs (mg/kg)										
Total PCB	10	4	2		1 2		0 12	50%	0%	04CS 03(0 0 1) 0902
Soil										
PCBs (mg/kg)										
PCB 1254	0 22	43	2		0 034		0 15	5%	0%	RA 04SB 01(0 0 5) 0902(J)
Total PCB	0 22	43	2		0 034		0 15	5%	0%	RA 04SB 01(0 0 5) 0902
Pesticides (mg/kg)										
4 4 DDE	1 7	27	1		0 0017		0 00	4%	0%	RA 04SB 06(0 0 5) 0902(J)
4 4 DDT	1 7	27	1		0 0019		0 00	4%	0%	RA 04SB 03(0 0 5) 0902(J)
Semivolatiles (mg/kg)										
Acenaphthene	1700	28	9		0 14		0 00	32%	0%	RA 04SB 06(0 0 5) 0902(J)
Acenaphthylene	0 0305	28	2		0 009		0 30	7%	0%	RA 04SB 06(0 0 5) 0902(J)
Anthracene	8500	28	14		0 36		0 00	50%	0%	RA 04SB 06(0 0 5) 0902
Benzo(a)anthracene	0 887	29	20	3	3 6	0 91	4 06	69%	10%	RA 04SB 06B(0 0 5) 0503
Benzo(a)pyrene	0 735	29	18	3	4 1	0 78	5 58	62%	10%	RA 04SB 06B(0 0 5) 0503
Benzo(b)fluoranthene	0 626	30	18	4	4 8	0 7	7 67	60%	13%	RA 04SB 06B(0 0 5) 0503
Benzo(g h i)perylene	0 478	29	16	3	3	0 52	6 28	55%	10%	RA 04SB 06B(0 0 5) 0503
Benzo(k)fluoranthene	6 2	28	18		0 51		0 08	64%	0%	RA 04SB 01(0 0 5) 0902
										RA 04SB 06(0 0 5) 0902
Chrysene	36	28	21		1 2		0 03	75%	0%	RA 04SB 06(0 0 5) 0902 DIL
Dibenz(a,h)anthracene	0 303	28	7		0 17		0 56	25%	0%	RA 04SB 08(04 05) 0902
Fluoranthene	1600	28	22		2 7		0 00	79%	0%	RA 04SB 06(0 0 5) 0902 DIL
Fluorene	1100	28	8		0 11		0 00	29%	0%	RA 04SB 06(0 0 5) 0902(J)
Indeno(1 2 3 cd)pyrene	0 62	29	17	2	3 2	0 87	5 16	59%	7%	RA 04SB 06B(0 0 5) 0503
Naphthalene	56	28	3		0 008		0 00	11%	0%	RA 04SB 06(0 0 5) 0902(J)
Phenanthrene	1 04	29	19	3	4 4	1 3	4 23	66%	10%	RA 04SB 06B(0 0 5) 0503
Pyrene	2100	28	23		2 2		0 00	82%	0%	RA 04SB 06(0 0 5) 0902 DIL
Metals (mg/kg)										
Antimony	31	28	18		11		0 35	64%	0%	RA 04SB 03(0 0 5) 0902(J)
Arsenic	13 2	28	28		6 7		0 51	100%	0%	RA 04SB 02(02 03) 0902(J)
Barium	5400	28	28		200		0 04	100%	0%	RA 04SB 06(04 05) 0902
Beryllium	1 01	28	28	4	1 9	1 3	1 88	100%	14%	RA 04SB 02(02 03) 0902
Cadmium	37	28	26		3 6		0 10	93%	0%	RA 04SB 06A(0 0 5) 0902
Chromium	210	28	28		48		0 23	100%	0%	RA 04SB 01A(02 03) 0902
Copper	1100	28	27		92		0 08	96%	0%	RA 04SB 06(09 10) 0902
Lead	363	28	28		185		0 51	100%	0%	RA 04SB 06(0 0 5) 0902
Mercury	0 6	28	18		0 052		0 09	64%	0%	RA 04SB 05(06 6 5) 0902(J)
Nickel	1600	28	28		28		0 02	100%	0%	RA 04SB 03(09 10) 0902

Table 4 8
Building 4 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Selenium	300	28	4		14		0 05	14%	0%	RA 04SB 07(0 0 5) 0902(J)
Thallium	5 2	28	11		0 25		0 05	39%	0%	RA 04SB 02(02 03) 0902(J)
Zinc	23000	28	28		201		0 01	100%	0%	RA 04SB 06(0 0 5) 0902
Volatiles (mg/kg)										
Ethylbenzene	8 9	28	10		0 013		0 00	36%	0%	RA 04SB 02(02 03) 0902(J) RA 04SB 06A(0 0 5) 0902(J) RA 04SB 07(0 0 5) 0902
Toluene	520	28	5		0 62		0 00	18%	0%	RA 04SB 03(04 05) 0902
Surface Wipe										
PCBs (ug/ft2)										
Total PCB	929	4	4		8 3		0 09	100%	0%	04SW 03 0902

Notes
* = Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 9
Building 5 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Mastic										
PCBs (mg/kg)										
Total PCB	50	3	3		4 5		0 09	100%	0%	05MC 01 0902
Soil										
Pesticides (mg/kg)										
4 4 DDE	1 7	32	22	1	65	65	38 24	69%	3%	RA 05SB 05(0 0 5) 0902(J)
4 4 DDT	1 7	32	29	1	1100	1100	647 06	91%	3%	RA 05SB 05(0 0 5) 0902(J)
Aldrin	0 029	32	1		0 0006		0 02	3%	0%	RA 05SB 06(0 0 5) 0902(J)
Semivolatiles (mg/kg)										
Acenaphthene	1700	35	17		2		0 00	49%	0%	RA 05SB 05(0 0 5) 0902(J)
Acenaphthylene	0 0305	35	6		0 003		0 10	17%	0%	RA 05SB 07(0 0 5) 0902(J)
Anthracene	8500	35	22		6		0 00	63%	0%	RA 05SB 05(0 0 5) 0902(J)
Benzo(a)anthracene	0 887	35	24	2	25	1 6	28 18	69%	6%	RA 05SB 05(0 0 5) 0902(J)
Benzo(a)pyrene	0 735	35	24	2	19	1 3	25 85	69%	6%	RA 05SB 05(0 0 5) 0902(J)
Benzo(b)fluoranthene	0 626	35	24	2	16	1 7	25 56	69%	6%	RA 05SB 05(0 0 5) 0902(J)
Benzo(g h i)perylene	0 478	35	23	2	14	0 87	29 29	66%	6%	RA 05SB 05(0 0 5) 0902(J)
Benzo(k)fluoranthene	6 2	35	25	1	19	19	3 06	71%	3%	RA 05SB 05(0 0 5) 0902(J)
Chrysene	36	35	26		22		0 61	74%	0%	RA 05SB 05(0 0 5) 0902(J)
Dibenz(a,h)anthracene	0 303	35	15	1	7 1	7 1	23 43	43%	3%	RA 05SB 05(0 0 5) 0902(J)
Fluoranthene	1600	35	30		54		0 03	86%	0%	RA 05SB 05(0 0 5) 0902(J)
Fluorene	1100	35	12		2 1		0 00	34%	0%	RA 05SB 05(0 0 5) 0902(J)
Indeno(1 2 3 cd)pyrene	0 62	35	25	2	11	0 8	17 74	71%	6%	RA 05SB 05(0 0 5) 0902(J)
Naphthalene	56	35	2		0 56		0 01	6%	0%	RA 05SB 05(0 0 5) 0902(J)
Phenanthrene	1 04	35	24	2	33	3	31 73	69%	6%	RA 05SB 05(0 0 5) 0902(J)
Pyrene	2100	35	30		44		0 02	86%	0%	RA 05SB 05(0 0 5) 0902(J)
Metals (mg/kg)										
Antimony	31	32	24		9 1		0 29	75%	0%	RA 05SB 03(02 03) 0902(J)
Arsenic	13 2	32	32		8 5		0 64	100%	0%	RA 05SB 05(0 0 5) 0902
Barium	5400	32	32		516		0 10	100%	0%	RA 05SB 05(0 0 5) 0902
Beryllium	1 01	32	32		0 88		0 87	100%	0%	RA 05SB 11(02 03) 0902
Cadmium	37	32	23		2 9		0 08	72%	0%	RA 05SB 04(0 0 5) 0902 RA 05SB 14(02 03) 0902
Chromium	210	32	32		151		0 72	100%	0%	RA 05SB 05(0 0 5) 0902
Copper	1100	32	32		118		0 11	100%	0%	RA 05SB 05(0 0 5) 0902
Lead	363	32	32	1	1790	1790	4 93	100%	3%	RA 05SB 05(0 0 5) 0902
Mercury	0 6	32	30		0 31		0 52	94%	0%	RA 05SB 05(0 0 5) 0902
Nickel	1600	32	32		36		0 02	100%	0%	RA 05SB 05(0 0 5) 0902
Selenium	300	32	10		23		0 08	31%	0%	RA 05SB 15(02 03) 0902

Table 4 9
Building 5 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Thallium	5 2	32	14		0 18		0 03	44%	0%	RA 05SB 04(0 0 5) 0902(J)
										RA 05SB 15(02 03) 0902(J)
Zinc	23000	32	32		880		0 04	100%	0%	RA 05SB 05(0 0 5) 0902
TPH (mg/kg)										
TPH	200	3	3		83		0 41	100%	0%	05SB 01(09 10) 0902
Volatiles (mg/kg)										
Ethylbenzene	8 9	32	7		0 013		0 00	22%	0%	RA 05SB 12(02 03) 0902(J)
Surface Wipe										
PCBs (ug/ft2)										
Total PCB	92 9	1	1		2 9		0 03	100%	0%	05SW 01 0902

Notes
* = Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 10
Building 6 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Mastic										
PCBs (mg/kg)										
Total PCB	50	3	3		14 9		0 30	100%	0%	06MC 01 0902
Sediment										
Semivolatiles (mg/kg)										
3 3 Dichlorobenzidine	1 1	1	1		0 052		0 05	100%	0%	06SD 01 0902(J)
Acenaphthene	1700	1	1		0 041		0 00	100%	0%	06SD 01 0902(J)
Acenaphthylene	0 0305	1	1		0 02		0 66	100%	0%	06SD 01 0902(J)
Anthracene	8500	1	1		0 085		0 00	100%	0%	06SD 01 0902(J)
Benzo(a)anthracene	0 887	1	1		0 16		0 18	100%	0%	06SD 01 0902(J)
Benzo(a)pyrene	0 735	1	1		0 22		0 30	100%	0%	06SD 01 0902
Benzo(b)fluoranthene	0 626	1	1		0 28		0 45	100%	0%	06SD 01 0902(J)
Benzo(g h i)perylene	0 478	1	1		0 2		0 42	100%	0%	06SD 01 0902
Benzo(k)fluoranthene	6 2	1	1		0 22		0 04	100%	0%	06SD 01 0902(J)
Butyl benzyl phthalate	930	1	1		0 38		0 00	100%	0%	06SD 01 0902
Chrysene	36	1	1		0 31		0 01	100%	0%	06SD 01 0902(J)
Di n octylphthalate	0 3	1	1		0 14		0 47	100%	0%	06SD 01 0902(J)
Dibenz(a,h)anthracene	0 303	1	1		0 023		0 08	100%	0%	06SD 01 0902(J)
Fluoranthene	1600	1	1		1 5		0 00	100%	0%	06SD 01 0902
Indeno(1 2 3 cd)pyrene	0 62	1	1		0 22		0 35	100%	0%	06SD 01 0902(J)
Naphthalene	56	1	1		0 044		0 00	100%	0%	06SD 01 0902(J)
Pentachlorophenol	3	1	1		0 016		0 01	100%	0%	06SD 01 0902(J)
Phenanthrene	1 04	1	1		0 81		0 78	100%	0%	06SD 01 0902
Pyrene	2100	1	1		0 59		0 00	100%	0%	06SD 01 0902
Metals (mg/kg)										
Antimony	31	1	1	1	66	66	2 13	100%	100%	06SD 01 0902
Arsenic	13 2	1	1	1	23	23	1 74	100%	100%	06SD 01 0902
Barium	5400	1	1		256		0 05	100%	0%	06SD 01 0902
Cadmium	37	1	1		0 77		0 02	100%	0%	06SD 01 0902(J)
Chromium	210	1	1	1	222	222	1 06	100%	100%	06SD 01 0902
Copper	1100	1	1		546		0 50	100%	0%	06SD 01 0902
Lead	363	1	1	1	2610	2610	7 19	100%	100%	06SD 01 0902
Mercury	0 6	1	1	1	3 6	3 6	6 00	100%	100%	06SD 01 0902
Nickel	1600	1	1		97		0 06	100%	0%	06SD 01 0902
Selenium	300	1	1		2 8		0 01	100%	0%	06SD 01 0902(J)
Silver	140	1	1		3		0 02	100%	0%	06SD 01 0902(J)
Thallium	5 2	1	1		0 17		0 03	100%	0%	06SD 01 0902(J)
Zinc	23000	1	1		10300		0 45	100%	0%	06SD 01 0902

Table 4 10
Building 6 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Volatiles (mg/kg)										
Toluene	520	1	1		0 015		0 00	100%	0%	06SD 01 0902(J)
Soil										
PCBs (mg/kg)										
PCB 1248	0 22	28	2		0 018		0 08	7%	0%	RA 06SB 10(0 0 5) 0902(J)
Total PCB	0 22	28	2		0 018		0 08	7%	0%	RA 06SB 10(0 0 5) 0902
Pesticides (mg/kg)										
4 4 DDD	2 4	28	2		0 0078		0 00	7%	0%	RA 06SB 06(0 0 5) 0902(J)
4 4 DDE	1 7	28	21		0 22		0 13	75%	0%	RA 06SB 04(02 03) 0902
4 4 DDT	1 7	29	24	2	21	4	12 35	83%	7%	RA 06SB 04(02 03) 0902 DIL
gamma BHC	0 44	28	1		0 0005		0 00	4%	0%	RA 06SB 14(0 0 5) 0902(J)
Semivolatiles (mg/kg)										
Acenaphthene	1700	31	12		0 002		0 00	39%	0%	RA 06SB 07(0 0 5) 0902(J) RA 06SB 12(0 0 5) 0902(J) RA 06SB 13(0 0 5) 0902(J)
Acenaphthylene	0 0305	31	3		0 005		0 16	10%	0%	RA 06SB 04(0 0 5) 0902(J)
Anthracene	8500	31	15		0 01		0 00	48%	0%	06SB 01(04 05) 0902(J)
Benzo(a)anthracene	0 887	31	17		0 21		0 24	55%	0%	06SB 01(04 05) 0902(J)
Benzo(a)pyrene	0 735	31	16		0 26		0 35	52%	0%	06SB 01(04 05) 0902
Benzo(b)fluoranthene	0 626	31	17		0 23		0 37	55%	0%	06SB 01(04 05) 0902(J)
Benzo(g h i)perylene	0 478	31	15		0 16		0 33	48%	0%	06SB 01(04 05) 0902
Benzo(k)fluoranthene	6 2	31	19		0 12		0 02	61%	0%	06SB 01(04 05) 0902(J)
Chrysene	36	31	24		0 16		0 00	77%	0%	06SB 01(04 05) 0902(J)
Dibenz(a,h)anthracene	0 303	31	9		0 043		0 14	29%	0%	06SB 01(04 05) 0902(J)
Fluoranthene	1600	31	25		0 24		0 00	81%	0%	06SB 01(04 05) 0902(J)
Fluorene	1100	31	4		0 002		0 00	13%	0%	06SB 01(04 05) 0902(J) RA 06SB 13(0 0 5) 0902(J)
Indeno(1 2 3 cd)pyrene	0 62	31	18		0 13		0 21	58%	0%	06SB 01(04 05) 0902(J)
Naphthalene	56	31	1		0 001		0 00	3%	0%	06SB 01(0 0 5) 0902(J)
Phenanthrene	1 04	31	19		0 028		0 03	61%	0%	RA 06SB 12(0 0 5) 0902(J) RA 06SB 13(0 0 5) 0902(J)
Pyrene	2100	31	25		0 29		0 00	81%	0%	06SB 01(04 05) 0902(J)
Metals (mg/kg)										
Antimony	31	28	10		4 1		0 13	36%	0%	RA 06SB 04(02 03) 0902 RA 06SB 09(0 0 5) 0902
Arsenic	13 2	28	28		5 7		0 43	100%	0%	RA 06SB 04(02 03) 0902 RA 06SB 09(0 0 5) 0902
Barium	5400	28	28		194		0 04	100%	0%	RA 06SB 05(0 0 5) 0902
Beryllium	1 01	28	28	7	1 6	1 1	1 58	100%	25%	RA 06SB 03(0 0 5) 0902

Table 4 10
Building 6 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Cadmium	37	28	28		4 2		0 11	100%	0%	RA 06SB 05(0 0 5) 0902
Chromium	210	28	28		31		0 15	100%	0%	RA 06SB 11(02 03) 0902
Copper	1100	28	28		85		0 08	100%	0%	RA 06SB 15(0 0 5) 0902
Lead	363	28	28		138		0 38	100%	0%	RA 06SB 15(0 0 5) 0902
Mercury	0 6	29	22	4	1 5	0 85	2 50	76%	14%	RA 06SB 02(0 0 5) 0902
Nickel	1600	28	28		26		0 02	100%	0%	RA 06SB 09(02 03) 0902
Thallium	5 2	28	28		0 25		0 05	100%	0%	RA 06SB 09(0 0 5) 0902(J)
Zinc	23000	28	28		169		0 01	100%	0%	RA 06SB 05(0 0 5) 0902
TPH (mg/kg)										
TPH	200	3	3		10 8		0 05	100%	0%	06SB 01(09 10) 0902
Volatiles[1] (mg/kg)										
1 2 4 Trichlorobenzene	270	28	1		0 034		0 00	4%	0%	RA 06SB 01(0 0 5) 0902(J)
Ethylbenzene	8 9	28	9		0 012		0 00	32%	0%	RA 06SB 03(02 03) 0902(J)
Surface Wipe										
PCBs (ug/ft2)										
Total PCB	92 9	4	4		73		0 79	100%	0%	06SW 03 0902

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4-4)

Table 4 11
Building 7 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Concrete										
TPH (mg/kg)										
TPH	200	1	1	1	2000	2000	10 00	100%	100%	07CS 01(0 0 1) 0802
Soil										
PCBs (mg/kg)										
PCB 1254	0 22	45	8	1	0 34	0 34	1 55	18%	2%	RA 07SB 02(0 0 5) 0902
Total PCB	0 22	45	8	1	0 34	0 34	1 55	18%	2%	RA 07SB 02(0 0 5) 0902
Semivolatiles (mg/kg)										
Acenaphthene	1700	44	25		0 15		0 00	57%	0%	RA 07SB 02(0 0 5) 0902(J)
Acenaphthylene	0 0305	44	15		0 013		0 43	34%	0%	RA 07SB 01(0 0 5) 0902(J)
Anthracene	8500	44	27		0 92		0 00	61%	0%	RA 07SB 01(0 0 5) 0902
Benzo(a)anthracene	0 887	44	30	4	3 8	0 9	4 28	68%	9%	RA 07SB 01(0 0 5) 0902 DIL
Benzo(a)pyrene	0 735	44	34	4	2 8	0 77	3 81	77%	9%	RA 07SB 01(0 0 5) 0902 DIL
Benzo(b)fluoranthene	0 626	44	32	7	4	0 7	6 39	73%	16%	RA 07SB 01(0 0 5) 0902 DIL
Benzo(g h i)perylene	0 478	44	27	5	1 9	0 5	3 97	61%	11%	RA 07SB 01(0 0 5) 0902 DIL
Benzo(k)fluoranthene	6 2	44	33		1 1		0 18	75%	0%	RA 07SB 02(0 0 5) 0902 DIL
Chrysene	36	44	36		3 4		0 09	82%	0%	RA 07SB 01(0 0 5) 0902 DIL
Dibenz(a,h)anthracene	0 303	44	21		0 25		0 83	48%	0%	RA 07SB 01(0 0 5) 0902
Fluoranthene	1600	44	41		7 8		0 00	93%	0%	RA 07SB 01(0 0 5) 0902 DIL
Fluorene	1100	44	22		0 15		0 00	50%	0%	RA 07SB 02(0 0 5) 0902(J)
Indeno(1 2 3 cd)pyrene	0 62	44	29	3	1 7	0 62	2 74	66%	7%	RA 07SB 01(0 0 5) 0902 DIL
Naphthalene	56	44	11		0 014		0 00	25%	0%	RA 07SB 02(0 0 5) 0902(J)
Phenanthrene	1 04	44	39	4	3	1 2	2 88	89%	9%	RA 07SB 01(0 0 5) 0902 DIL
Pyrene	2100	44	41		6 1		0 00	93%	0%	RA 07SB 01(0 0 5) 0902 DIL
Metals (mg/kg)										
Antimony	31	44	25		6 5		0 21	57%	0%	RA 07SB 15(0 0 5) 0902(J)
Arsenic	13 2	44	44		7 3		0 55	100%	0%	RA 07SB 03(0 0 5) 0902
Barium	5400	44	44		262		0 05	100%	0%	RA 07SB 12(0 0 5) 0902
Beryllium	1 01	44	44	2	1 3	1 1	1 29	100%	5%	RA 07SB 13(09 10) 0902
Cadmium	37	44	24		4 1		0 11	55%	0%	RA 07SB 02(0-0 5) 0902
Chromium	210	44	44		55		0 26	100%	0%	RA 07SB 11(04 05) 0902
Copper	1100	44	44		209		0 19	100%	0%	RA 07SB 07(0 0 5) 0902
Lead	363	44	44	1	900	900	2 48	100%	2%	RA 07SB 15(0 0 5) 0902
Mercury	0 6	44	40		0 078		0 13	91%	0%	RA 07SB 07(04 05) 0902(J)
Nickel	1600	44	44		29		0 02	100%	0%	RA 07SB 02(0 0 5) 0902
Selenium	300	44	4		17		0 06	9%	0%	RA 07SB 14(04 05) 0902(J) RA 07SB 15(0 0 5) 0902(J)
Silver	140	44	1		0 2		0 00	2%	0%	RA 07SB 02(0 0 5) 0902(J)

Table 4 11
Building 7 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Thallium	5 2	44	13		0 24		0 05	30%	0%	RA 07SB 05(0 0 5) 0902(J)
Zinc	23000	44	44		201		0 01	100%	0%	RA 07SB 12(0 0 5) 0902
Volatiles (mg/kg)										
Ethylbenzene	8 9	44	6		0 021		0 00	14%	0%	RA 07SB 02(0 0 5) 0902(J)
Naphthalene	56	44	1		0 14		0 00	2%	0%	RA 07SB 02(0 0 5) 0902(J)
Toluene	520	44	1		0 026		0 00	2%	0%	RA 07SB 12(04 05) 0902(J)
Xylenes (Total)	270	44	2		0 098		0 00	5%	0%	RA 07SB 02(0 0 5) 0902(J)

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 12
Building 8 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Sediment										
TPH (mg/kg)										
TPH	200	2	1		38		0 19	50%	0%	08SD 02 0902
Soil										
PCBs (mg/kg)										
PCB 1254	0 22	61	2		0 023		0 10	3%	0%	RA 08SB 06(0 0 5) 0902(J) RA 08SB 14(0 0 5) 0902(J)
PCB 1260	0 22	61	1		0 17		0 77	2%	0%	RA 08SB 20(0 0 5) 0902(J)
Total PCB	0 22	61	3		0 17		0 77	5%	0%	RA 08SB 20(0 0 5) 0902
Semivolatiles (mg/kg)										
Acenaphthene	1700	61	26		0 27		0 00	43%	0%	RA 08SB 07(04 05) 0902(J)
Acenaphthylene	0 0305	62	12	3	0 096	0 049	3 15	19%	5%	RA 08SB 16(04 05) 0902(J)
Anthracene	8500	61	32		0 53		0 00	52%	0%	RA 08SB 07(04 05) 0902
Benzo(a)anthracene	0 887	62	33	1	2	2	2 25	53%	2%	RA 08SB 07(04 05) 0902
Benzo(a)pyrene	0 735	62	34	1	0 99	0 99	1 35	55%	2%	RA 08SB 07(04 05) 0902
Benzo(b)fluoranthene	0 626	61	37		0 47		0 75	61%	0%	RA 08SB 09(09 10) 0902
Benzo(g h i)perylene	0 478	58	27	1	0 81	0 81	1 69	47%	2%	RA 08SB 07(04 05) 0902
Benzo(k)fluoranthene	6 2	61	34		0 31		0 05	56%	0%	RA 08SB 12(09 10) 0902(J)
Chrysene	36	61	38		2 3		0 06	62%	0%	RA 08SB 07(04 05) 0902
Dibenz(a,h)anthracene	0 303	61	20		0 14		0 46	33%	0%	RA 08SB 07(04 05) 0902(J)
Fluoranthene	1600	55	42		1 3		0 00	76%	0%	RA 08SB 09(09 10) 0902 DIL
Fluorene	1100	61	22		0 61		0 00	36%	0%	RA 08SB 07(04 05) 0902
Indeno(1 2 3 cd)pyrene	0 62	61	31		0 23		0 37	51%	0%	RA 08SB 12(09 10) 0902(J)
Naphthalene	56	61	7		0 45		0 01	11%	0%	RA 08SB 07(04 05) 0902
Phenanthrene	1 04	62	42	2	2 6	1 1	2 50	68%	3%	RA 08SB 07(04 05) 0902
Pyrene	2100	61	49		6 5		0 00	80%	0%	RA 08SB 07(04 05) 0902
Metals (mg/kg)										
Antimony	31	61	34		8		0 26	56%	0%	RA 08SB 03(0 0 5) 0902(J)
Arsenic	13 2	61	61		9 8		0 74	100%	0%	RA 08SB 18(0 0 5) 0902
Barium	5400	61	61		322		0 06	100%	0%	RA 08SB 03(0 0 5) 0902
Beryllium	1 01	61	61		0 94		0 93	100%	0%	RA 08SB 18(0 0 5) 0902
Cadmium	37	61	36		4 1		0 11	59%	0%	RA 08SB 16(04 05) 0902
Chromium	210	61	61		30		0 14	100%	0%	RA 08SB 03(04 05) 0902 RA 08SB 07(04 05) 0902
Copper	1100	61	61		112		0 10	100%	0%	RA 08SB 15(04 05) 0902
Lead	363	61	61		197		0 54	100%	0%	RA 08SB 16(0 0 5) 0902
Mercury	0 6	61	59		0 043		0 07	97%	0%	RA 08SB 15(14 15) 0902(J)
Nickel	1600	61	61		30		0 02	100%	0%	RA 08SB 03(0 0 5) 0902
Selenium	300	61	17		21		0 07	28%	0%	RA 08SB 03(09 10) 0902

Table 4 12
Building 8 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Silver	140	61	1		1 3		0 01	2%	0%	RA 08SB 05(0 0 5) 0902(J)
Thallium	5 2	61	47		0 62		0 12	77%	0%	RA 08SB 05(09 10) 0902(J)
Zinc	23000	61	61		220		0 01	100%	0%	RA 08SB 15(04 05) 0902
TPH (mg/kg)										
TPH	200	25	20	1	1065	1065	5 33	80%	4%	08SB 07(07 08) 0902
Volatiles (mg/kg)										
1 1 Dichloroethane (1 1 DCA)	510	61	1		0 034		0 00	2%	0%	RA 08SB 05(0 0 5) 0902(J)
1 1 Dichloroethene (1 1 DCE)	0 4	62	1		0 17		0 42	2%	0%	RA 08SB 05(0 0 5) 0902
Bromomethane	3 9	61	1		0 048		0 01	2%	0%	RA 08SB 12(0 0 5) 0902(J)
Ethylbenzene	8 9	61	10		0 016		0 00	16%	0%	RA 08SB 06(04 05) 0902(J)

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 13
Building 10 Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Soil										
TPH (mg/kg)										
TPH	200	20	9		130		0 65	45%	0%	10SB 03A(09 10) 0902
Volatiles (mg/kg)										
Benzene	0 6	17	1		0 014		0 02	6%	0%	10SB 03(0 0 5) 0902(J)
Ethylbenzene	8 9	17	4		0 03		0 00	24%	0%	10SB 03(0 0 5) 0902(J)
Xylenes (Total)	270	17	4		0 18		0 00	24%	0%	10SB 03(0 0 5) 0902(J)

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 14
Northeast Parking Area Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Soil										
PCBs (mg/kg)										
PCB 1248	0 22	24	1		0 0086		0 04	4%	0%	RA NESB 04(04 05) 0802(J)
PCB 1260	0 22	24	2		0 012		0 05	8%	0%	RA NESB 01(0 0 5) 0802(J)
Total PCB	0 22	24	3		0 012		0 05	13%	0%	RA NESB 01(0 0 5) 0802
Semivolatiles (mg/kg)										
Acenaphthene	1700	24	14		0 12		0 00	58%	0%	RA NESB 01(0 0 5) 0802(J)
Acenaphthylene	0 0305	24	2		0 006		0 20	8%	0%	RA NESB 01(0 0 5) 0802(J)
Anthracene	8500	24	14		0 41		0 00	58%	0%	RA NESB 01(0 0 5) 0802
Benzo(a)anthracene	0 887	25	14	1	2 2	2 2	2 48	56%	4%	RA NESB 01(0 0 5) 0802
Benzo(a)pyrene	0 735	25	14	1	1 8	1 8	2 45	56%	4%	RA NESB 01(0 0 5) 0802
Benzo(b)fluoranthene	0 626	25	14	1	2 5	2 5	3 99	56%	4%	RA NESB 01(0 0 5) 0802
Benzo(g h i)perylene	0 478	25	14	1	1 3	1 3	2 72	56%	4%	RA NESB 01(0 0 5) 0802
Benzo(k)fluoranthene	6 2	24	14		0 58		0 09	58%	0%	RA NESB 01(0 0 5) 0802
Chrysene	36	24	14		2 5		0 07	58%	0%	RA NESB 01(0 0 5) 0802
Dibenz(a,h)anthracene	0 303	24	7		0 19		0 63	29%	0%	RA NESB 01(0 0 5) 0802(J)
Fluoranthene	1600	24	17		7 7		0 00	71%	0%	RA NESB 01(0 0 5) 0802
Fluorene	1100	24	14		0 16		0 00	58%	0%	RA NESB 01(0 0 5) 0802(J)
Indeno(1 2 3 cd)pyrene	0 62	25	14	1	1 1	1 1	1 77	56%	4%	RA NESB 01(0 0 5) 0802
Naphthalene	56	24	9		0 028		0 00	38%	0%	RA NESB 03(0 0 5) 0802(J)
Phenanthrene	1 04	25	15	1	4 6	4 6	4 42	60%	4%	RA NESB 01(0 0 5) 0802
Pyrene	2100	24	18		5 4		0 00	75%	0%	RA NESB 01(0 0 5) 0802
Metals (mg/kg)										
Antimony	31	24	16		5 4		0 17	67%	0%	RA NESB 05(04 05) 0802(J)
Arsenic	13 2	24	24		9 8		0 74	100%	0%	RA NESB 02(0 0 5) 0802
Barium	5400	24	24		263		0 05	100%	0%	RA NESB 05(04 05) 0802
Beryllium	1 01	24	24		0 94		0 93	100%	0%	RA NESB 06(0 0 5) 0802
Cadmium	37	24	21		2 9		0 08	88%	0%	RA NESB 01(0 0 5) 0802
Chromium	210	24	24		24		0 11	100%	0%	RA NESB 01(09 10) 0802
Copper	1100	24	24		19		0 02	100%	0%	RA NESB 04(0 0 5) 0802 RA NESB 05(04 05) 0802
Lead	363	24	23		54		0 15	96%	0%	RA NESB 04(0 0 5) 0802
Mercury	0 6	24	24		0 051		0 08	100%	0%	RA NESB 05(0 0 5) 0802(J)
Nickel	1600	24	24		22		0 01	100%	0%	RA NESB 01(04 05) 0802
Selenium	300	24	1		3 8		0 01	4%	0%	RA NESB 01(0 0 5) 0802(J)
Thallium	5 2	24	24		0 38		0 07	100%	0%	RA NESB 06(0 0 5) 0802(J)
Zinc	23000	24	24		90		0 00	100%	0%	RA NESB 04(0 0 5) 0802

Table 4 14
Northeast Parking Area Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Volatiles (mg/kg)										
1 1 Dichloroethene (1 1 DCE)	0 4	24	1		0 036		0 09	4%	0%	RA NESB 03(0 0 5) 0802(J)
1 4 Dichlorobenzene	3 4	24	1		0 016		0 00	4%	0%	RA NESB 03(0 0 5) 0802(J)
Ethylbenzene	8 9	24	1		0 015		0 00	4%	0%	RA NESB 01(09 10) 0802(J)

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 15
Railroads Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Soil										
PCBs (mg/kg)										
PCB 1248	0 22	33	1		0 037		0 17	3%	0%	RA RRSB 01(04 05) 0802(J)
Total PCB	0 22	33	1		0 037		0 17	3%	0%	RA RRSB 01(04 05) 0802
Semivolatiles (mg/kg)										
Acenaphthene	1700	33	8		0 055		0 00	24%	0%	RA RRSB 10(09 10) 0802(J)
Acenaphthylene	0 0305	33	6		0 012		0 39	18%	0%	RA RRSB 10(0 0 5) 0802(J)
Anthracene	8500	33	13		0 12		0 00	39%	0%	RA RRSB 08(04 05) 0802(J)
Benzo(a)anthracene	0 887	33	12		0 26		0 29	36%	0%	RA RRSB 08(04 05) 0802(J)
Benzo(a)pyrene	0 735	33	11		0 19		0 26	33%	0%	RA RRSB 08(04 05) 0802(J)
Benzo(b)fluoranthene	0 626	33	12		0 22		0 35	36%	0%	RA RRSB 08(04 05) 0802(J)
Benzo(g h i)perylene	0 478	33	11		0 11		0 23	33%	0%	RA RRSB 08(04 05) 0802(J)
Benzo(k)fluoranthene	6 2	33	12		0 12		0 02	36%	0%	RA RRSB 08(04 05) 0802(J)
Chrysene	36	33	14		0 21		0 01	42%	0%	RA RRSB 08(04 05) 0802(J)
Dibenz(a,h)anthracene	0 303	33	6		0 034		0 11	18%	0%	RA RRSB 08(04 05) 0802(J)
Fluoranthene	1600	32	23		0 59		0 00	72%	0%	RA RRSB 08(04 05) 0802
Fluorene	1100	33	9		0 08		0 00	27%	0%	RA RRSB 10(09 10) 0802(J)
Indeno(1 2 3 cd)pyrene	0 62	33	11		0 1		0 16	33%	0%	RA RRSB 08(04 05) 0802(J)
Naphthalene	56	33	7		0 071		0 00	21%	0%	RA RRSB 10(09 10) 0802(J)
Phenanthrene	1 04	33	22		0 43		0 41	67%	0%	RA RRSB 08(04 05) 0802
Pyrene	2100	33	24		0 46		0 00	73%	0%	RA RRSB 08(04 05) 0802
Metals (mg/kg)										
Antimony	31	33	16		5 7		0 18	48%	0%	RA RRSB 02(09 10) 0802(J)
Arsenic	13 2	33	33		9 5		0 72	100%	0%	RA RRSB 10(04 05) 0802 RA RRSB 11(0 0 5) 0902
Barium	5400	33	33		314		0 06	100%	0%	RA RRSB 02(09 10) 0802
Beryllium	1 01	33	33	1	1 3	1 3	1 29	100%	3%	RA RRSB 02(09 10) 0802
Cadmium	37	33	2		0 42		0 01	6%	0%	RA RRSB 04(09 11) 0802(J)
Chromium	210	33	33		48		0 23	100%	0%	RA RRSB 02(09 10) 0802
Copper	1100	33	33		22		0 02	100%	0%	RA RRSB 03(09 10) 0802
Lead	363	33	26		98		0 27	79%	0%	RA RRSB 08(09 10) 0802
Mercury	0 6	33	33		0 051		0 08	100%	0%	RA RRSB 08(09 10) 0802(J)
Nickel	1600	33	33		44		0 03	100%	0%	RA RRSB 02(09 10) 0802
Selenium	300	33	10		17		0 06	30%	0%	RA RRSB 09(0 0 5) 0902
Thallium	5 2	33	30		0 33		0 06	91%	0%	RA RRSB 10(04 05) 0802(J)
Zinc	23000	33	33		160		0 01	100%	0%	RA RRSB 07(0 0 5) 0802
Volatiles (mg/kg)										
1 1 1 Trichloroethane	1200	33	6		0 094		0 00	18%	0%	RA RRSB 07(04 05) 0802(J)
1 1 Dichloroethane (1 1 DCA)	510	33	1		0 012		0 00	3%	0%	RA RRSB 03(04 06) 0802(J)
1 1 Dichloroethene (1 1 DCE)	0 4	37	1		0 075		0 19	3%	0%	RA RRSB 10(0 0 5) 0802(J)

Table 4 15
Railroads Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
1 2 Dichlorobenzene	370	33	1		0 034		0 00	3%	0%	RA RRSB 10(0 0 5) 0802(J)
1 2 Dichloroethane	0 28	33	6		0 044		0 16	18%	0%	RA RRSB 10(0 0 5) 0802(J)
1 2 Dichloropropane	0 34	33	1		0 034		0 10	3%	0%	RA RRSB 10(0 0 5) 0802(J)
1 3 Dichlorobenzene	16	33	1		0 029		0 00	3%	0%	RA RRSB 10(0 0 5) 0802(J)
1 4 Dichlorobenzene	3 4	33	1		0 014		0 00	3%	0%	RA RRSB 10(0 0 5) 0802(J)
Benzene	0 6	33	1		0 034		0 06	3%	0%	RA RRSB 10(0 0 5) 0802(J)
Chloroform	0 8	33	2		0 041		0 05	6%	0%	RA RRSB 10(0 0 5) 0802(J)
Chloromethane	1 2	33	2		0 042		0 04	6%	0%	RA RRSB 06(0 0 5) 0802(J)
Ethylbenzene	8 9	33	1		0 011		0 00	3%	0%	RA RRSB 09(0 0 5) 0902(J)
Hexachlorobutadiene	6 2	33	3		0 22		0 04	9%	0%	RA RRSB 06(0 0 5) 0802
Naphthalene	56	33	3		1 4		0 02	9%	0%	RA RRSB 10(09 10) 0802(J)
Toluene	520	33	3		0 063		0 00	9%	0%	RA RRSB 10(0 0 5) 0802(J)
Xylenes (Total)	270	33	1		0 094		0 00	3%	0%	RA RRSB 10(0 0 5) 0802(J)

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4-4)

Table 4 16
Roadways Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Soil										
PCBs (mg/kg)										
PCB 1248	0 22	96	3		0 055		0 25	3%	0%	RA RDSB 07E(0 0 5) 0802(J)
PCB 1260	0 22	96	2		0 015		0 07	2%	0%	RA RDSB 02E(0 0 5) 0802(J)
Total PCB	0 22	96	5		0 055		0 25	5%	0%	RA RDSB 07E(0-0 5) 0802
Semivolatiles (mg/kg)										
Acenaphthene	1700	96	23		0 15		0 00	24%	0%	RA RDSB 02(09 10) 0802(J)
Acenaphthylene	0 0305	96	4		0 003		0 10	4%	0%	RA RDSB 14E(0 0 5) 0902(J)
										RA RDSB 16E(0 0 5) 0802(J)
Anthracene	8500	96	41		0 73		0 00	43%	0%	RA RDSB 02(09 10) 080?
Benzo(a)anthracene	0 887	98	48	1	1 2	1 2	1 35	49%	1%	RA RDSB 02(09 10) 0802
Benzo(a)pyrene	0 735	98	49	1	1 1	1 1	1 50	50%	1%	RA RDSB 02(09 10) 0802
Benzo(b)fluoranthene	0 626	98	51	1	1 5	1 5	2 40	52%	1%	RA RDSB 02(09 10) 0802
Benzo(g h i)perylene	0 478	98	41	1	0 56	0 56	1 17	42%	1%	RA RDSB 02(09 10) 0802
Benzo(k)fluoranthene	6 2	96	51		0 53		0 09	53%	0%	RA RDSB 02(09 10) 0802
Chrysene	36	96	54		1 4		0 04	56%	0%	RA RDSB 02(09 10) 0802
Dibenz(a,h)anthracene	0 303	96	21		0 16		0 53	22%	0%	RA RDSB 02(09 10) 0802(J)
Fluoranthene	1600	96	74		3 1		0 00	77%	0%	RA RDSB 02(09 10) 0802
Fluorene	1100	96	22		0 16		0 00	23%	0%	RA RDSB 02(09 10) 0802(J)
Indeno(1 2 3 cd)pyrene	0 62	96	43		0 59		0 95	45%	0%	RA RDSB 02(09 10) 0802
Naphthalene	56	96	7		0 045		0 00	7%	0%	RA RDSB 16E(0 0 5) 0802(J)
Phenanthrene	1 04	98	61	1	1 6	1 6	1 54	62%	1%	RA RDSB 02(09 10) 0802
Pyrene	2100	96	72		2 5		0 00	75%	0%	RA RDSB 02(09 10) 0802
Metals (mg/kg)										
Antimony	31	99	30	1	34	34	1 10	30%	1%	RA RDSB 16E(0 0 5) 0802
Arsenic	13 2	96	96		11		0 83	100%	0%	RA RDSB 01(04 05) 0802
										RA RDSB 12E(0 0 5) 0802
Barium	5400	96	96		262		0 05	100%	0%	RA RDSB 08E(09 10) 0802
Beryllium	1 01	96	96	5	6 7	1 1	6 63	100%	5%	RA RDSB 06E(0 0 5) 0802
Cadmium	37	96	28		2 8		0 08	29%	0%	RA RDSB 14(04 05) 0902
Chromium	210	96	96		37		0 18	100%	0%	RA RDSB 06E(0 0 5) 0802
Copper	1100	96	96		70		0 06	100%	0%	RA RDSB 12(0 0 5) 0802
Lead	363	96	69		91		0 25	72%	0%	RA RDSB 02E(04 05) 0802
Mercury	0 6	96	84		0 065		0 11	88%	0%	RA RDSB 14(0 0 5) 0902(J)
Nickel	1600	96	96		28		0 02	100%	0%	RA RDSB 16(0 0 5) 0802
Selenium	300	96	22		21		0 07	23%	0%	RA RDSB 02E(0 0 5) 0802
										RA RDSB 04E(04 05) 0802
Silver	140	96	1		4 2		0 03	1%	0%	RA RDSB 09E(09 10) 0802(J)

Table 4 16
Roadways Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Thallium	5 2	96	94		0 36		0 07	98%	0%	RA RDSB 03(09 10) 0802(J) RA RDSB 12E(0 0 5) 0802(J)
Zinc	23000	96	96		120		0 01	100%	0%	RA RDSB 02E(04 05) 0802
Volatiles (mg/kg)*										
1 1 1 Trichloroethane	1200	96	3		0 27		0 00	3%	0%	RA RDSB 05E(0 0 5) 0802
1 1 Dichloroethane (1 1 DCA)	510	96	2		0 19		0 00	2%	0%	RA RDSB 01E(09 10) 0802(J)
1 1 Dichloroethene (1 1 DCE)	0 4	98	1		0 1		0 25	1%	0%	RA RDSB 01E(09 10) 0802(J)
1 2 Dichloroethane	0 28	96	8		0 012		0 04	8%	0%	RA RDSB 03(04 05) 0802(J)
Benzene	0 6	96	1		0 026		0 04	1%	0%	RA RDSB 08(0 0 5) 0802(J)
Bromomethane	3 9	96	1		0 038		0 01	1%	0%	RA RDSB 03E(04 05) 0802(J)
Chloroethane	3	96	1		0 26		0 09	1%	0%	RA RDSB 01E(09 10) 0802(J)
Chloroform	0 8	96	1		0 026		0 03	1%	0%	RA RDSB 08(0 0 5) 0802(J)
Ethylbenzene	8 9	96	1		0 029		0 00	1%	0%	RA RDSB 08(0 0 5) 0802(J)
Methylene chloride	9 1	96	4		0 093		0 01	4%	0%	RA RDSB 07(09 10) 0802(J)
Naphthalene	56	96	2		0 22		0 00	2%	0%	RA RDSB 16E(0 0 5) 0802(J)
Toluene	520	96	24		0 15		0 00	25%	0%	RA RDSB 02E(0 0 5) 0802(J)
Trichloroethene (TCE)	0 053	96	2		0 041		0 77	2%	0%	RA RDSB 10(0 0 5) 0802(J)
Xylenes (Total)	270	96	1		0 075		0 00	1%	0%	RA RDSB 08(0 0 5) 0802(J)

Notes
* = Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4-4)

Table 4 17
Sewer System Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Sediment										
Dioxins (pg/g)										
2 3 7 8 TCDD	3 9	1	1	1	390	390	100 00	100%	100%	SRSD 02 0503
Dioxin TEQ*	3 9	1	1	1	2180 28	2180 28	559 05	100%	100%	SRSD 02 0503
PCBs (mg/kg)										
PCB 1248	0 22	6	6	6	48	3 2	218 18	100%	100%	SRSD 02 0802
PCB 1260	0 22	6	4	3	1 8	0 34	8 18	67%	50%	02SD 01 0802(J)
Total PCB	0 22	6	6	6	49 4	3 54	224 55	100%	100%	SRSD 02 0802
Semivolatiles (mg/kg)										
2 4 Dimethylphenol	1200	3	1		0 2		0 00	33%	0%	SRSD 03 0802(J)
Acenaphthene	1700	3	3		16		0 01	100%	0%	SRSD 04 0802
Acenaphthylene	0 0305	3	1	1	0 59	0 59	19 34	33%	33%	SRSD 04 0802(J)
Anthracene	8500	3	3		22		0 00	100%	0%	SRSD 04 0802
Benzo(a)anthracene	0 887	3	3	2	80	2 1	90 19	100%	67%	SRSD 04 0802
Benzo(a)pyrene	0 735	3	3	3	66	0 94	89 80	100%	100%	SRSD 04 0802
Benzo(b)fluoranthene	0 626	3	2	2	100	2 6	159 74	67%	67%	SRSD 04 0802
Benzo(g h i)perylene	0 478	3	2	2	44	2 2	92 05	67%	67%	SRSD 04 0802
Benzo(k)fluoranthene	6 2	3	2	1	40	40	6 45	67%	33%	SRSD 04 0802
Bis(2 ethylhexyl)phthalate	35	3	3		9 7		0 28	100%	0%	SRSD 04 0802
Butyl benzyl phthalate	930	3	1		0 86		0 00	33%	0%	SRSD 03 0802(J)
Chrysene	36	3	3	1	88	88	2 44	100%	33%	SRSD 04 0802
Di n butylphthalate	2300	3	1		0 68		0 00	33%	0%	SRSD 04 0802(J)
Di n octylphthalate	0 3	3	1	1	2	2	6 67	33%	33%	SRSD 02 0802(J)
Dibenz(a,h)anthracene	0 303	3	1	1	11	11	36 30	33%	33%	SRSD 04 0802
Diethylphthalate	2000	3	1		4 1		0 00	33%	0%	SRSD 04 0802(J)
Fluoranthene	1600	3	3		260		0 16	100%	0%	SRSD 04 0802
Fluorene	1100	3	2		14		0 01	67%	0%	SRSD 04 0802
Indeno(1 2 3 cd)pyrene	0 62	3	2	2	37	1 6	59 68	67%	67%	SRSD 04 0802
Naphthalene	56	3	2		7 3		0 13	67%	0%	SRSD 02 0802(J)
Phenanthrene	1 04	3	3	3	190	5 4	182 69	100%	100%	SRSD 04 0802
Pyrene	2100	3	3		170		0 08	100%	0%	SRSD 04 0802
Metals (mg/kg)										
Antimony	31	5	4	4	55	39	1 77	80%	80%	SRSD 03 0802
Arsenic	13 2	5	5	3	31	25	2 35	100%	60%	02SD 01 0802
Barium	5400	5	5		218		0 04	100%	0%	SRSD 04 0802
Beryllium	1 01	5	5		0 6		0 59	100%	0%	02SD 02 0802
Cadmium	37	5	4		17		0 46	80%	0%	SRSD 02 0802
Chromium	210	5	5	3	360	215	1 71	100%	60%	SRSD 02 0802
Copper	1100	5	5	1	1290	1290	1 17	100%	20%	SRSD 03 0802
Lead	363	5	5	2	3660	424	10 08	100%	40%	SRSD 04 0802

Table 4 17
Sewer System Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Mercury	0 6	5	5	1	5 24	5 24	8 73	100%	20%	SRSD 02 0802
Nickel	1600	5	5		540		0 34	100%	0%	SRSD 02 0802
Selenium	300	5	4		115		0 38	80%	0%	SRSD 02 0802
Silver	140	5	4		17		0 12	80%	0%	SRSD 02 0802
Thallium	5 2	5	2		0 24		0 05	40%	0%	02SD 02 0802(J)
Zinc	23000	5	5		1030		0 04	100%	0%	SRSD 04 0802
TPH (mg/kg)										
TPH*	200	5	5	5	37060	6340	185 30	100%	100%	SRSD 02 0802
Volatiles (mg/kg)										
1 1 1 Trichloroethane	1200	5	4	1	3900	3900	3 25	80%	20%	02SD 02 0802
1 1 2 Trichloroethane	0 73	5	1		0 04		0 05	20%	0%	SRSD 02 0802(J)
1 1 Dichloroethane (1 1 DCA)	510	5	5	1	640	640	1 25	100%	20%	02SD 02 0802
1 1 Dichloroethene (1 1 DCE)	0 4	5	1		0 083		0 21	20%	0%	SRSD 02 0802
1 2 4 Trichlorobenzene	270	5	2		0 2		0 00	40%	0%	SRSD 04 0802(J)
1 2 Dichlorobenzene	370	5	2		1 4		0 00	40%	0%	SRSD 02 0802(J)
1 2 Dichloroethane	0 28	5	4	1	0 98	0 98	3 50	80%	20%	02SD 02 0802
1 2 Dichloropropane	0 34	5	1		0 06		0 18	20%	0%	02SD 02 0802(J)
1 3 Dichlorobenzene	16	5	1		0 038		0 00	20%	0%	SRSD 02 0802(J)
1 4-Dichlorobenzene	3 4	5	3		2 9		0 85	60%	0%	SRSD 04 0802
Benzene	0 6	5	3		0 087		0 14	60%	0%	02SD 02 0802
Bromomethane	3 9	5	1		0 043		0 01	20%	0%	02SD 01 0802(J)
Chloroethane	3	5	5	2	36	3	12 00	100%	40%	SRSD 02 0802
Chloroform	0 8	5	1		0 39		0 49	20%	0%	02SD 02 0802
Chloromethane	1 2	5	1		0 4		0 33	20%	0%	02SD 02 0802
Ethylbenzene	8 9	5	5		0 6		0 07	100%	0%	02SD 02 0802
Hexachlorobutadiene	6 2	5	1		0 081		0 01	20%	0%	SRSD 02 0802
Methylene chloride	9 1	5	1	1	22	22	2 42	20%	20%	02SD 02 0802(J)
Naphthalene	56	5	5		6 4		0 11	100%	0%	SRSD 02 0802
Tetrachloroethene (PERC)	1 5	5	4		0 89		0 59	80%	0%	02SD 02 0802
Toluene	520	5	5		1 6		0 00	100%	0%	SRSD 02 0802
Trichloroethene (TCE)	0 053	5	4	2	0 52	0 13	9 81	80%	40%	02SD 02 0802
Vinyl chloride (VC)	0 079	5	1	1	0 13	0 13	1 65	20%	20%	SRSD 02 0802
Xylenes (Total)	270	5	5		3 3		0 01	100%	0%	02SD 02 0802
Soil										
PCBs (mg/kg)										
PCB 1248	0 22	112	1		0 0071		0 03	1%	0%	SRSB 24(16 17) 0802(J)
PCB 1254	0 22	112	1		0 0087		0 04	1%	0%	SRSB 03(12 13) 0802(J)
Total PCB	0 22	112	2		0 0087		0 04	2%	0%	SRSB 03(12 13) 0802

Table 4 17
Sewer System Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Semivolatiles (mg/kg)										
1 2 Diphenylhydrazine	0 61	91	44		0 012		0 02	48%	0%	SRSB 34(23 24) 0902(J)
2 4 6 Trichlorophenol	6 1	112	1		0 072		0 01	1%	0%	SRSB 19(10 11) 0902(J)
2 4 Dinitrotoluene (2 4 DNT)	2	112	1		0 004		0 00	1%	0%	SRSB 33(08 09) 0802(J)
3 3 Dichlorobenzidine	1 1	112	2		0 047		0 04	2%	0%	SRSB 16(06 07) 0902(J)
Acenaphthene	1700	112	15		0 81		0 00	13%	0%	SRSB 39(10 11) 0503
Acenaphthylene	0 0305	112	3		0 004		0 13	3%	0%	SRSB 16(06 07) 0902(J)
Anthracene	8500	112	16		1 2		0 00	14%	0%	SRSB 30(03 04) 0802
Benzo(a)anthracene	0 887	114	26	1	2 6	2 6	2 93	23%	1%	SRSB 30(03 04) 0802
Benzo(a)pyrene	0 735	114	30	1	2 1	2 1	2 86	26%	1%	SRSB 30(03 04) 0802
Benzo(b)fluoranthene	0 626	114	34	1	2 5	2 5	3 99	30%	1%	SRSB 30(03 04) 0802
Benzo(g h i)perylene	0 478	114	17	1	1 4	1 4	2 93	15%	1%	SRSB 30(03 04) 0802
Benzo(k)fluoranthene	6 2	112	31		1 4		0 23	28%	0%	SRSB 30(03 04) 0802
Bis(2-ethylhexyl)phthalate	35	112	64		0 17		0 00	57%	0%	SRSB 07(21 22) 0802(J)
Butyl benzyl phthalate	930	112	49		0 085		0 00	44%	0%	SRSB 18(14 15) 0902(J)
Chrysene	36	112	35		2 6		0 07	31%	0%	SRSB 30(03 04) 0802
Di n butylphthalate	2300	111	52		0 36		0 00	47%	0%	SRSB 07(16 17) 0802
Di n octylphthalate	0 3	112	15		0 027		0 09	13%	0%	SRSB 16(06 07) 0902(J)
Dibenz(a,h)anthracene	0 303	114	5	1	0 36	0 36	1 19	4%	1%	SRSB 30(03 04) 0802
Dibenzofuran	110	21	1		0 43		0 00	5%	0%	SRSB 39(10 11) 0503
Diethylphthalate	2000	112	42		0 012		0 00	38%	0%	SRSB 19(06 07) 0902(J)
Dimethylphthalate	1360	112	24		0 004		0 00	21%	0%	SRSB 21(07 08) 0802(J)
Fluoranthene	1600	112	56		6 3		0 00	50%	0%	SRSB 30(03 04) 0802
Fluorene	1100	112	13		0 69		0 00	12%	0%	SRSB 39(10 11) 0503
Hexachlorobenzene	0 3	112	1		0 002		0 01	1%	0%	SRSB 17(19 20) 0902(J)
Indeno(1 2 3 cd)pyrene	0 62	114	22	1	1 4	1 4	2 26	19%	1%	SRSB 30(03 04) 0802
Isophorone	510	102	8		0 01		0 00	8%	0%	SRSB 02(16 17) 0802(J)
N Nitrosodiphenylamine	99	112	3		0 021		0 00	3%	0%	SRSB 18(14 15) 0902(J)
Naphthalene	56	112	1		0 14		0 00	1%	0%	SRSB 39(10 11) 0503(J)
Pentachlorophenol	3	112	1		0 003		0 00	1%	0%	SRSB 06(16 17) 0802(J)
Phenanthrene	1 04	114	47	2	4 7	2 1	4 52	41%	2%	SRSB 30(03 04) 0802
Phenol	5200	112	1		0 002		0 00	1%	0%	SRSB 31(25 26) 0902(J)
Pyrene	2100	112	57		5		0 00	51%	0%	SRSB 30(03 04) 0802
Metals (mg/kg)										
Antimony	31	112	50		8 6		0 28	45%	0%	SRSB 26(24 25) 0802(J)
Arsenic	13 2	112	111	1	20 6	20 6	1 56	99%	1%	SRSB 35(24 25) 0503
Barium	5400	95	95		713		0 13	100%	0%	SRSB 09(18 19) 0802
Beryllium	1 01	112	112	20	3 6	1 2	3 56	100%	18%	SRSB 05(25 26) 0802
Cadmium	37	112	36		3 2		0 09	32%	0%	SRSB 34(23 24) 0902
Chromium	210	112	112		43		0 20	100%	0%	SRSB 13(23 24) 0802

Table 4 17
Sewer System Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Copper	1100	112	112		36		0 03	100%	0%	SRSB 02(16 17) 0802 SRSB 26(24 25) 0802
Lead	363	112	98		31		0 09	88%	0%	SRSB 19(10 11) 0902
Mercury	0 6	112	70		0 052		0 09	63%	0%	SRSB 15(14 15) 0802(J)
Nickel	1600	112	112		60		0 04	100%	0%	SRSB 09(18 19) 0802
Selenium	300	112	33		45		0 15	29%	0%	SRSB 03(16 17) 0802
Thallium	5 2	112	106		3		0 58	95%	0%	SRSB 35(24 25) 0503
Zinc	23000	112	112		158		0 01	100%	0%	SRSB 27(26 27) 0802
TPH (mg/kg)										
TPH	200	117	24	3	600	530	3 00	21%	3%	SRSB 19(14 15) 0902
Volatiles (mg/kg)										
1 1 1 Trichloroethane	1200	112	2		0 0026		0 00	2%	0%	SRSB 39(10 11) 0503(J)
1 1 Dichloroethane (1 1 DCA)	510	112	2		0 0085		0 00	2%	0%	SRSB 36(20 21) 0503
1 1 Dichloroethene (1 1 DCE)	0 4	112	2		0 0018		0 00	2%	0%	SRSB 36(23 24) 0503(J)
1 2 4 Trimethylbenzene	52	21	1		0 0029		0 00	5%	0%	SRSB 39(10 11) 0503(J)
1 3 5 Trimethylbenzene	21	21	1		0 00089		0 00	5%	0%	SRSB 39(10 11) 0503(J)
1 3 Dichlorobenzene	16	112	1		0 00044		0 00	1%	0%	SRSB 39(06 07) 0503(J)
1 4 Dichlorobenzene	3 4	112	1		0 00065		0 00	1%	0%	SRSB 39(06 07) 0503(J)
Benzene	0 6	112	1		0 00059		0 00	1%	0%	SRSB 38(10 11) 0503(J)
Bromomethane	3 9	112	4		0 05		0 01	4%	0%	SRSB 05(25 26) 0802(J)
Carbon disulfide	360	21	6		0 003		0 00	29%	0%	SRSB 39(15 16) 0503(J)
Chloroform	0 8	112	1		0 0013		0 00	1%	0%	SRSB 36(23 24) 0503(J)
Chloromethane	1 2	112	1		0 0034		0 00	1%	0%	SRSB 36(16 17) 0503(J)
Ethylbenzene	8 9	112	8		0 015		0 00	7%	0%	SRSB 26(19 20) 0802(J)
Methylene chloride	9 1	112	3		0 17		0 02	3%	0%	SRSB 33(12 13) 0802(J)
Naphthalene	56	112	2		0 041		0 00	2%	0%	SRSB 21(12 13) 0802(J)
sec Butylbenzene	220	21	1		0 00045		0 00	5%	0%	SRSB 41(17 18) 0503(J)
Styrene	1500	21	1		0 00051		0 00	5%	0%	SRSB 41(17 18) 0503(J)
Tetrachloroethene (PERC)	1 5	112	2		0 0043		0 00	2%	0%	SRSB 39(10 11) 0503(J)
Toluene	520	112	25		0 036		0 00	22%	0%	SRSB 18(21 22) 0902(J)
Wastewater										
PCBs (ug/l)										
PCB 1248	0 034	10	10	10	6 8	0 13	200 00	100%	100%	SRWW 04 0802
Total PCB	0 034	10	10	10	6 8	0 13	200 00	100%	100%	SRWW 04 0802
Semivolatiles (ug/l)										
1 2 Diphenylhydrazine	0 084	8	2		0 071		0 85	25%	0%	SRWW 02 0802(J)
Acenaphthene	370	8	5		1		0 00	63%	0%	SRWW 04 0802(J)
Anthracene	1800	8	5		3		0 00	63%	0%	SRWW 04 0802(J)
Benzidine	0 00012	8	1	1	2 3	2 3	19166 67	13%	13%	SRWW 10 0802
Benzo(a)anthracene	0 0044	8	7	7	9 7	0 079	2204 55	88%	88%	SRWW 04 0802

Table 4 17
Sewer System Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Benzo(a)pyrene	0 0092	8	6	6	9 2	0 13	1000 00	75%	75%	SRWW 04 0802
Benzo(b)fluoranthene	0 0044	8	7	7	12	0 11	2727 27	88%	88%	SRWW 04 0802
Benzo(k)fluoranthene	0 0044	8	7	7	5 8	0 092	1318 18	88%	88%	SRWW 04 0802
Bis(2-ethylhexyl)phthalate	4 8	8	8		3 3		0 69	100%	0%	SRWW 01 0802(J)
Butyl benzyl phthalate	3000	8	1		0 82		0 00	13%	0%	SRWW 01 0802(J)
Chrysene	0 0044	8	7	7	13	0 079	2954 55	88%	88%	SRWW 04 0802
Di n butylphthalate	2700	8	8		0 71		0 00	100%	0%	SRWW 04 0802(J) SRWW 07 0802(J)
Di n octylphthalate	1500	8	1		0 097		0 00	13%	0%	SRWW 04 0802(J)
Dibenz(a,h)anthracene	0 0044	8	4	4	1 8	0 21	409 09	50%	50%	SRWW 04 0802
Fluoranthene	300	8	8		22		0 07	100%	0%	SRWW 04 0802
Fluorene	240	8	6		0 92		0 00	75%	0%	SRWW 04 0802(J)
Indeno(1 2 3 cd)pyrene	0 0044	8	6	6	8 8	0 08	2000 00	75%	75%	SRWW 04 0802
Naphthalene	6 2	8	2		0 2		0 03	25%	0%	SRWW 04 0802(J)
Pentachlorophenol	0 56	8	1		0 058		0 10	13%	0%	SRWW 06 0802(J)
Pyrene	180	8	8		20		0 11	100%	0%	SRWW 04 0802
Metals (ug/l)										
Antimony	6	10	10		1 4		0 23	100%	0%	02WW 01 0802
Arsenic	0 045	10	10	10	3 2	0 9	71 11	100%	100%	02WW 02 0802
Barium	2000	10	10		130		0 07	100%	0%	SRWW 07 0802
Beryllium	4	10	3		1		0 25	30%	0%	02WW 01 0802
Cadmium	5	10	1	1	19	19	3 80	10%	10%	02WW 02 0802
Chromium	100	10	5		13		0 13	50%	0%	02WW 01 0802(J)
Copper	1300	10	10		140		0 11	100%	0%	02WW 01 0802
Lead	15	10	10	8	412	15	27 47	100%	80%	02WW 01 0802
Nickel	100	10	2		31		0 31	20%	0%	02WW 01 0802
Selenium	50	10	10		16		0 32	100%	0%	SRWW 10 0802
Silver	100	10	3		5		0 05	30%	0%	SRWW 06 0802(J)
Thallium	2	10	1		0 09		0 04	10%	0%	02WW 01 0802(J)
Zinc	2000	10	10		1420		0 71	100%	0%	02WW 02 0802
TPH (ug/l)										
TPH	10000	10	4		53		0 01	40%	0%	SRWW 11 0802
Volatiles (ug/l)										
1 1 1 Trichloroethane	200	10	5	1	340	340	1 70	50%	10%	02WW 02 0802
1 1 Dichloroethane (1 1 DCA)	810	10	5		390		0 48	50%	0%	02WW 02 0802
1 1 Dichloroethene (1 1 DCE)	7	10	3		2 1		0 30	30%	0%	SRWW 03 0802
1 2 4 Trichlorobenzene	70	10	2		1 2		0 02	20%	0%	SRWW 06 0802(J)
1 2 Dichloroethane	0 12	10	2	2	1 2	0 4	10 00	20%	20%	02WW 02 0802
1 4 Dichlorobenzene	0 5	10	1	1	1 2	1 2	2 40	10%	10%	SRWW 04 0802
Carbon tetrachloride (CT)	0 17	10	1	1	2 1	2 1	12 35	10%	10%	SRWW 06 0802
Chloroethane	4 6	10	4	3	150	38	32 61	40%	30%	SRWW 02 0802

Table 4 17
Sewer System Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Chloroform	6 2	10	1		0 3		0 05	10%	0%	SRWW 06 0802(J)
Ethylbenzene	2 9	10	1		0 8		0 28	10%	0%	SRWW 11 0802(J)
Methylene chloride	4 3	10	1	1	49	49	11 40	10%	10%	02WW 02 0802
Tetrachloroethene (PERC)	0 66	10	1		0 3		0 45	10%	0%	02WW 01 0802(J)
Toluene	150	10	2		0 2		0 00	20%	0%	02WW 01 0802(J) SRWW 11 0802(J)
Trichloroethene (TCE)	0 028	10	1	1	10	10	357 14	10%	10%	SRWW 11 0802
Vinyl chloride (VC)	0 02	10	1	1	0 5	0 5	25 00	10%	10%	02WW 02 0802(J)
Xylenes (Total)	210	10	2		4		0 02	20%	0%	SRWW 11 0802

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4 3 and 4 4)

Table 4 18
Water Level Measurements and Groundwater Elevations
St Louis Army Ammunition Plant, St Louis, Missouri

Well ID	Ground Surface Elevation	Top of Casing Elevation	Depth to Bottom of Well	Water Level (ft from top of casing) 08/27/2002	08/28/2002	09/03/2002	09/05/2002	09/16/2002	09/17/2002	09/18/2002	09/19/2002	04/30/2003	05/08/2003
02MW 01	532 91	532 76	18 10	8 19					8 42	13 81		8 79	8 79
03MW 01*	533 11	532 70	16 30	13 61	12 91	8 34	11 90		7 34			6 34	6 40
08MW 01*	532 55	532 28	26 90	dry	dry	22 42	24 64	11 95				18 32	18 18
08MW 02	533 10	532 79	21 10	dry	dry	17 73	19 22	16 72				8 62	8 46
08MW 03*	533 35	532 90	19 40	11 66	10 22	9 08	12 40		9 30			6 42	6 78
10MW 01	535 56	535 37	18 74	9 00						9 10	9 07	8 42	8 32
SWMW 01	533 09	532 73	20 25						11 96	12 34		10 81	10 43
SWMW 02	535 35	535 13	20 20	8 30					6 71	13 25		6 95	6 73
SWMW 03	535 83	535 64	20 10	10 14					10 38	17 38		10 42	7 28
SWMW 04	536 43	536 21	27 35							11 95	21 20	9 14	9 20
SWMW 05	532 94	532 70	24 95	8 25						6 91	6 58	6 51	5 07
SWMW 06	527 02	526 86	17 95	8 96						8 62	8 54	6 90	6 94
SWMW 07	526 00	525 72	18 97	8 80						8 09	8 74	8 21	7 27

Well ID	Ground Surface Elevation	Top of Casing Elevation	Bottom of Well Elevation	Groundwater Elevation (ft MSL) 08/27/2002	08/28/2002	09/03/2002	09/05/2002	09/16/2002	09/17/2002	09/18/2002	09/19/2002	04/30/2003	05/08/2003
02MW 01	532 91	532 76	514 66	524 57					524 34	518 95		523 97	523 97
03MW 01*	533 11	532 70	516 40	519 09	519 79	524 36	520 80		525 36			526 36	526 30
08MW 01*	532 55	532 28	505 38	505 38	505 38	509 86	507 64	520 33				513 96	514 10
08MW 02*	533 10	532 79	511 69	511 69	511 69	515 06	513 57	516 07				524 17	524 33
08MW 03	533 35	532 90	513 50	521 24	522 68	523 82	520 50		523 60			526 48	526 12
10MW 01	535 56	535 37	516 63	526 37						526 27	526 30	526 95	527 05
SWMW 01	533 09	532 73	512 48						520 77	520 39		521 92	522 30
SWMW 02	535 35	535 13	514 93	526 83					528 42	521 83		528 18	528 40
SWMW 03	535 83	535 64	515 54	525 50					525 26	518 26		525 22	528 36
SWMW 04	536 43	536 21	508 86							524 26	515 01	527 07	527 01
SWMW 05	532 94	532 70	507 75	524 45						525 79	526 12	526 19	527 63
SWMW 06	527 02	526 86	508 91	517 90						518 24	518 52	519 96	519 92
SWMW 07	526 00	525 72	506 75	516 92						517 63	516 98	517 51	518 45

Water Level taken after purging well dry the previous day

* = Well installed August 2002

Table 4 19
Groundwater Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Groundwater										
Inorganics (mg/l)										
Fluoride	2 2	3	3		0 44		0 20	100%	0%	03MW 01 0902
Nitrate (NO3)	10	13	11		2 6		0 26	85%	0%	SWMW 04 0902
Semivolatiles (ug/l)										
1 2 Diphenylhydrazine	0 084	13	2	1	0 35	0 35	4 17	15%	8%	08MW 01 0902(J)
Acenaphthene	370	13	3		0 97		0 00	23%	0%	08MW 02 0902(J)
Anthracene	1800	13	11		0 02		0 00	85%	0%	SWMW 02 0902(J)
Benzo(a)anthracene	0 0044	13	13	10	0 066	0 0044	15 00	100%	77%	08MW 02 0902
Benzo(a)pyrene	0 0092	13	13	10	0 092	0 01	10 00	100%	77%	08MW 02 0902
Benzo(b)fluoranthene	0 0044	13	13	12	0 099	0 0054	22 50	100%	92%	08MW 02 0902
Benzo(k)fluoranthene	0 0044	13	13	11	0 19	0 0044	43 18	100%	85%	08MW 02 0902
Bis(2 ethylhexyl)phthalate	4 8	13	4		0 75		0 16	31%	0%	03MW 01 0902(J)
Chrysene	0 0044	13	13	11	0 13	0 0061	29 55	100%	85%	08MW 02 0902
Di n butylphthalate	2700	13	3		0 8		0 00	23%	0%	SWMW 07 0902(J)
Di n octylphthalate	1500	13	2		0 18		0 00	15%	0%	SWMW 02 0902(J)
Dibenz(a,h)anthracene	0 0044	13	13	5	0 077	0 0047	17 50	100%	38%	08MW 02 0902
Diethylphthalate	23000	13	1		0 51		0 00	8%	0%	08MW 01 0902(J)
Fluoranthene	300	13	13		0 34		0 00	100%	0%	08MW 02 0902(J)
Fluorene	240	13	13		0 49		0 00	100%	0%	08MW 02 0902(J)
Indeno(1 2 3 cd)pyrene	0 0044	13	9	5	0 11	0 0066	25 00	69%	38%	08MW 02 0902
Naphthalene	6 2	13	6		0 8		0 13	46%	0%	08MW 02 0902(J)
Pyrene	180	13	13		0 36		0 00	100%	0%	08MW 02 0902(J)
Metals (ug/l)										
Arsenic	0 045	13	13	13	7 8	0 3	173 33	100%	100%	08MW 01 0902
Barium	2000	13	13		410		0 20	100%	0%	SWMW 02 0902
Beryllium	4	13	1		0 8		0 20	8%	0%	SWMW 07 0902(J)
Cadmium	5	13	1		3		0 60	8%	0%	SWMW 07 0902(J)
Copper	1300	13	6		18		0 01	46%	0%	SWMW 07 0902
Lead	15	13	12	1	44	44	2 93	92%	8%	SWMW 07 0902
Nickel	100	13	6		67		0 67	46%	0%	08MW 02 0902
Selenium	50	13	13		14		0 28	100%	0%	02MW 01 0902
Thallium	2	13	1		0 2		0 10	8%	0%	SWMW 07 0902(J)
Zinc	2000	13	4		67		0 03	31%	0%	SWMW 07 0902
Volatiles (ug/l)										
1 1 1 Trichloroethane	200	13	1		12		0 06	8%	0%	02MW 01 0902
1 1 Dichloroethane (1 1 DCA)	810	13	2		65		0 08	15%	0%	02MW 01 0902
1 1 Dichloroethene (1 1 DCE)	7	13	1	1	34	34	4 86	8%	8%	02MW 01 0902
1 2 Dichloroethane	0 12	13	1	1	0 4	0 4	3 33	8%	8%	02MW 01 0902
Carbon tetrachloride (CT)	0 17	13	1	1	1	1	5 88	8%	8%	02MW 01 0902

Table 4 19
Groundwater Data Summary
St Louis Army Ammunition Plant, St Louis, Missouri

Chemical	Screening Level	Samples Analyzed	Samples w/ Detections	Samples w/ Detections > SL	Max Conc	Min > SL	Max Conc/SL	% Samples w/ Detections	% Samples w/ Conc>SL	Max Conc Sample ID & Qualifier
Chloroform	6 2	13	1	1	10	10	1 61	8%	8%	02MW 01 0902
Toluene	150	13	2		0 6		0 00	15%	0%	08MW 01 0902(J)
Tap Water										
Inorganics (mg/l)										
Fluoride	2 2	1	1		1		0 45	100%	0%	FIRE HYDRANT

Notes
= Value calculated by URS
SL = Screening Level (see Tables 4 2 4-3 and 4-4)

Table 5 1

Physical and Chemical Properties of the Potential Chemicals of Concern
St Louis Army Ammunition Plant, St Louis, Missouri

Parameter	Molecular Formula	Molecular Weight	Melting Point (C)	Ref	Boiling Point (C)	Ref	Specific Gravity (g/cm^3)	Ref	Water Solubility (mg/L @ 25 C)	Ref	Vapor Pressure (mm Hg @ 25 C)	Ref	Soil Adsorption Coefficient Log K (cm^3/g)	Ref	Octanol Water Partition Coefficient Log K_{ow} (cm /g)	Ref
Dioxin																
2 3 7 8 TCDD	$C_1 H_4Cl O$	321 98	300	a	412	a	1 827	a	2 0E 04	a	1 4E 09	a	6 66	a	6 5	a
Metals																
Antimony	Sb	121 8	630 6	b	1587	b	6 691	b	No Data	f	1 0	c	No Data	f	0 73	d
Arsenic	As	74 9	817	b	No Data	f	5 73	b	No Data	f	0 0	c	No Data	f	0 68	d
Beryllium	Be	9 01	128 7	b	2471	b	1 848	b	No Data	f	0 0	c	No Data	f	0 57	d
Copper	Cu	63 5	1084	b	2562	b	8 96	b	No Data	f	0 0	c	No Data	f	0 57	d
Lead	Pb	207 2	327	b	1749	b	11 35	b	No Data	f	0 0	c	No Data	f	0 73	d
Mercury	Hg	200 6	38 8	b	356 7	b	13 55	b	No Data	f	0 015 (50 C)	b	No Data	f	0 62	d
PCBs																
PCB 1248	Not definitu e	222 358	7	a	340-375	a	1 41	a	0 060 (24 C)	a	4 94E 04	a	5 64	a	6 1	a
PCB 1254	Not definitu e	327 (a e)	10	a	365 390	a	1 5		0 012	a	7 71E 05	a	5 61	a	6 4	a
Pesticides																
4 4 DDE	C_1 H Cl	319 03	88 90	a	No Data	f	No Data	f	~0 01	a	6 49E 06 (30 C)	a	6 0	a	5 8	a
4 4 DDT	C_1 H Cl_5	354 49	108	a	185 260	a	1 56	a	0 003	a	1 5E 07	a	5 3	a	6 2	a
SVOCs																
1 2 Diphenylhydrazine	C_1 H $_2N_2$	184 24	130	a	No Data	f	1 158	a	221	a	2 6E 05	a	2 82	a	2 94	a
Acenaphthylene	C H_8	152 2	92	a	280	a	0 8988	a	3 93	a	2 9E 02	a	3 68	a	4 07	a
Benzo(a)anthracene	C $_8$H $_2$	228 3	158	a	400	a	1 274	a	9 0E-03	a	1 1E 07	a	6 14	a	5 90	a
Benzo(a)pyrene	$C_{20}H_{12}$	252 32	179	a	495	a	1 351	a	3 8E 03	a	5 6E 09	a	5 9	a	6 0	a
Benzo(b)fluoranthe e	C_{20}H	252 32	168	a	No Data	f	No Data	f	0 014	a	5E 7 (20 C)	a	5 74	a	6 57	a
Benzo(g h ı)perylene	$C_{22}H_2$	276 34	277	a	>500	a	No Data	f	2 6E-04	a	1 0E 10	a	6 89	a	7 10	a
Benzo(k)fluoranthene	C $_0$H	252 32	217	a	480	a	No Data	f	5 5E 04	a	9 6E 11	a	6 64	a	6 85	a
Chrysene	C $_8H_{12}$	228 30	254	e	448	a	1 274	e	6 0E 03	a	6 3E 09	a	5 39	a	5 6	
Dibenz(a,h)anthracene	$C_{22}H_1$	278 35	262	a	269	a	1 282	a	5 0E 04	a	1 0E 10 (20 C)	a	6 22	a	6 3	a
Indeno(1 2 3-cd)pyrene	C H_2	276 34	164	a	530	a	No Data	f	0 062	a	1 0E 10	a	7 49	a	6 0 7 0	a
Phenanthrene	C_1 H $_0$	178 24	100	a	340	a	1 179	a	1 18	a	6 8E 04	a	~4 0	a	~4 4	a
TPH																
TPH DRO	DRO s range from C_{10} to C_{29} All the peaks in the range are grouped together to yield a s ngle quant tat e gro p represent g the diesel range organ cs															
VOCs																
1 1 Dichloro th ne	C_2H_2Cl	96 94	123	b	31 6	b	1 213	b	273	a	591		1 81		2	
1 2 Dichloroethane	C_2H Cl	98 96	35 3	a	83 5	a	1 24	a	8300	a	64 (20 C)	a	1 2	a	1 5	a
Carbon Tetrachloride	CCl	153 82	22 96	a	77	a	1 59	a	1160		113		2 4		2 7	a
Chloroform	$CHCl_3$	119 38	63 5	a	61 7	a	1 48	a	9300	a	198	a	1 6	a	1 9	a

Ref rence Sou c s

a Groundwater Chemicals Desk Reference Montogomery J H and L M Welkom Lewis Publishers 1990

b Handbook of Chemistry and Physics 75th Edition CRC Press 1995

c Superfund Public Health Evaluation Manual U S Environmental Protection Agency Office of Solid Waste and Emergency Response 1986

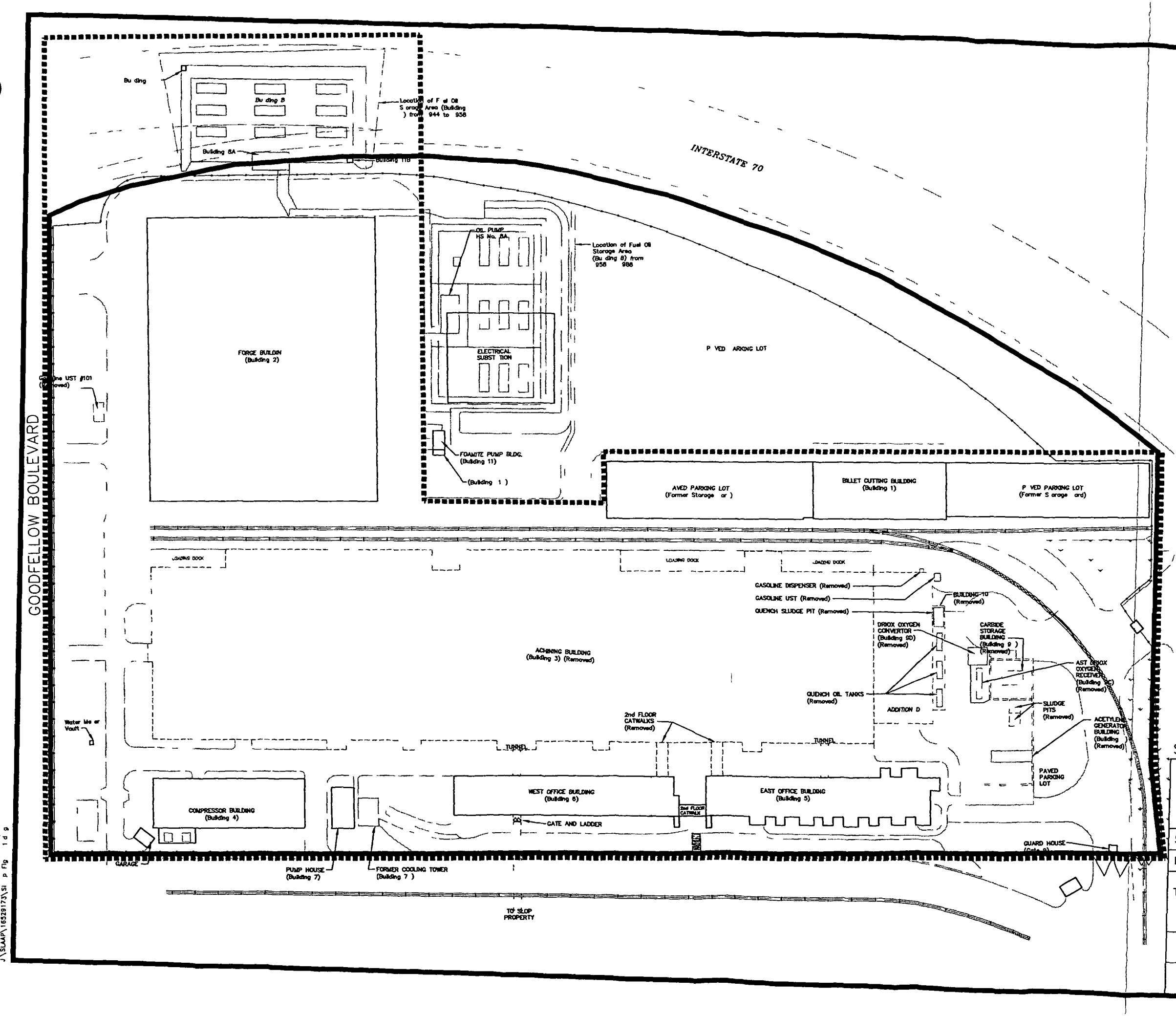
d Meylan W M and P H Howard 1995 Atom/fragment contribution method for estimating octanol water partit on coeff c ents J Pharm Sci 84 83 92

e Handbook of Environmental Data on Organic Chemicals Verchueren K Van Nostrand Reinhold Company 1977

f No data

Table 6 1
Exposure Areas Evaluated in the HHRA
St Louis Army Ammunition Plant (SLAAP)
St Louis Missouri

EXPOSURE AREA	
Focused Hotspot Areas	Systematic Risk Assessment Areas
Building 1 hotspot A (1A)	Building 1
Building 1 hotspot B (1B)	Building 2
Building 1 hotspot C (1C)	Building 4
Building 2 hotspot (2)	Building 5
Building 4 hotspot A (4A)	Building 6
Building 4 hotspot B (4B)	Building 7
Building 4 hotspot C (4C)	Building 8
Building 4 hotspot D (4D)	Northeast Parking Area
Building 5 hotspot A (5A)	Railroads
Building 5 hotspot B (5B)	Roadways
Building 6 hotspot (6)	
Building 7 hotspot A (7A)	Combined Data points
Building 7 hotspot B (7B)	Site Wide
Building 7 hotspot C (7C)	
Building 8 hotspot A (8A)	
Building 8 hotspot B (8B)	
Northeast Parking Area hotspot (NE)	
Roadways hotspot A (RDA)	
Roadways hotspot B (RDB)	
Roadways hotspot C (RDC)	
Railroad hotspot (RR)	
Sewer Line hotspot A (SEA)	
Sewer Line hotspot B (SEB)	



LEGEND

- ORIGINAL SLAAP PROPERTY BOUNDARY (1944 to 1958)
- PRESENT SLAAP PROPERTY BOUNDARY (1958 TO PRESENT)

N

100 0 100 200

SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	INSTALLATION LAYOUT

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	1-1

F bru ry 9 200 8 43 51 m (nus)
J \SLAAP\16529173\SI p Fig 1 d g

Building 1 A
Building B
Location Fuel Oil Storage Area (Building 6) from 944 to 958
Building 8A
Building B
INTERSTATE 70
OIL PUMP HS. o. 8A
Location of Fuel Oil Storage Area (Building 8) from 58 958
FORGE BUILDING (Building 2)
ELECTRICAL SUBSTATION
PAVED PARKING LOT
Gasoline UST #101 (Removed)
FOAMITE PUMP BLDG. (Building 11)
(Building 1)
PAVED PARKING LOT (Former Storage Yard)
BILLET CUTTING BUILDING (Building 1)
PAVED PARKING LOT (Former Storage Yard)
LOADING DOCK
LOADING DOCK
LOADING DOCK
GASOLINE DISPENSER (Removed)
GASOLINE UST (Removed)
QUENCH SLUDGE PIT (Removed)
BUILDING 10 (Removed)
DROX OXYGEN CONVERTOR (Building 8D) (Removed)
CARBIDE STORAGE BUILDING (Building) (Removed)
AST DROX OXYGEN RECEIVER (Building 8C) (Removed)
MACHINE BUILDING (Building 3) (Removed)
QUENCH OIL TANKS (Removed)
ADDITION D
SLUDGE PITS (Removed)
ACETYLENE GENERATOR BUILDING (Building 9) (Removed)
2nd FLOOR CATWALKS (Removed)
Water Meter Vault
TUNNEL
TUNNEL
PAVED PARKING LOT
A/C
WEST OFFICE BUILDING (Building 6)
EAST OFFICE BUILDING (Building 5)
CONVEYOR
COMPRESSOR BUILDING (Building 4)
2nd FLOOR CATWALK
GATE AND LADDER
PRIER SERT ACHIMES
A/C PL /C /C PL A/C PL
GUARD HOUSE (Gat 9)
GARAGE
PUMP HOUSE (Building 7)
FORMER COOLING TOWER (Building 7A)
70' SLOP PROPERTY

LEGEND

- FENCE
- RAILROAD
- /C BUCKET ASSEMBLE AND CRIMP STATION
- POWDER LOADING STATION

NOTE

ONLY BUILDINGS 3 5 6 AND 9 EXISTED PRIOR TO 1944 ALL OTHER SLAAP BUILDINGS WERE CONSTRUCTED AFTER 1944

N

100 0 100 200

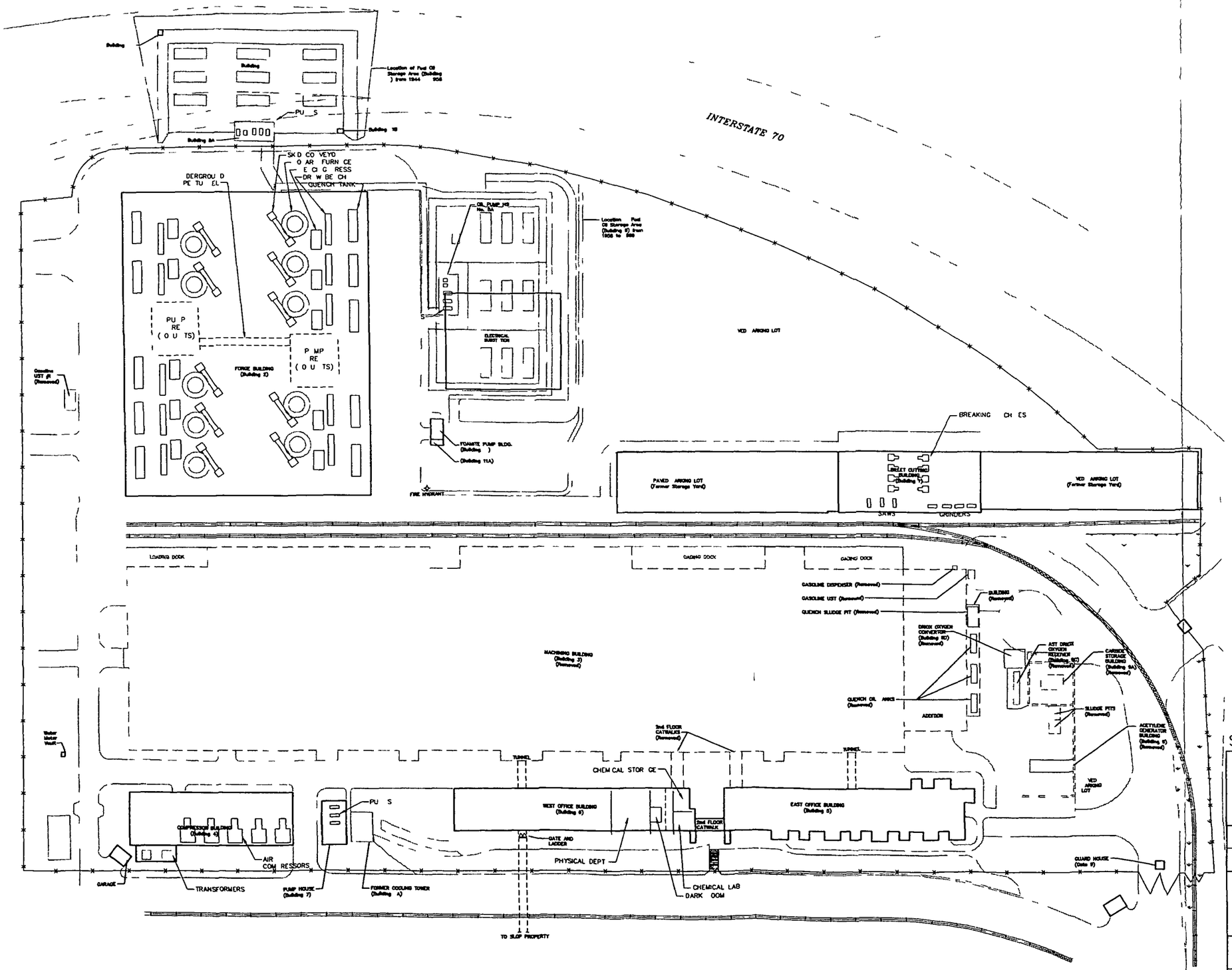
SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	PROCESS EQUIPMENT LAYOUT FROM 1941 TO 1944

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	1-2

F bru ry 19 2004 9 19 39 m (TWS)
J \SLAAP\16529173\Si p Fig 1 2 d g



LEGEND

FENCE

RAILROAD

NOTE

THIS FIGURE PRESENTS THE PROCESS EQUIPMENT LAYOUT AFTER 1944 PROCESSES IN BUILDINGS 5 AND 6 ARE DIFFERENT FROM THOSE IN FIGURE 1-2 WHILE PROCESSES HAVE BEEN ADDED TO BUILDINGS 1 2 4 7 AND 8

N

100 0 100 200

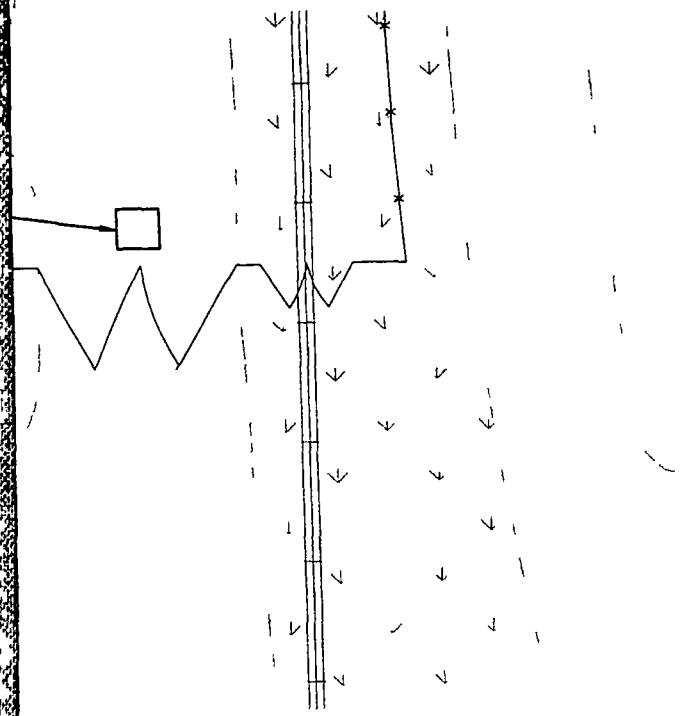
SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	PROCESS EQUIPMENT LAYOUT AFTER 1944

DRAWN BY	CHK'D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	1-3

F bru ry 19 2004 9 20 35 m (T S)
J \SLAAP\16529173\SI p Fig 1 3 d g



40 0 40 80

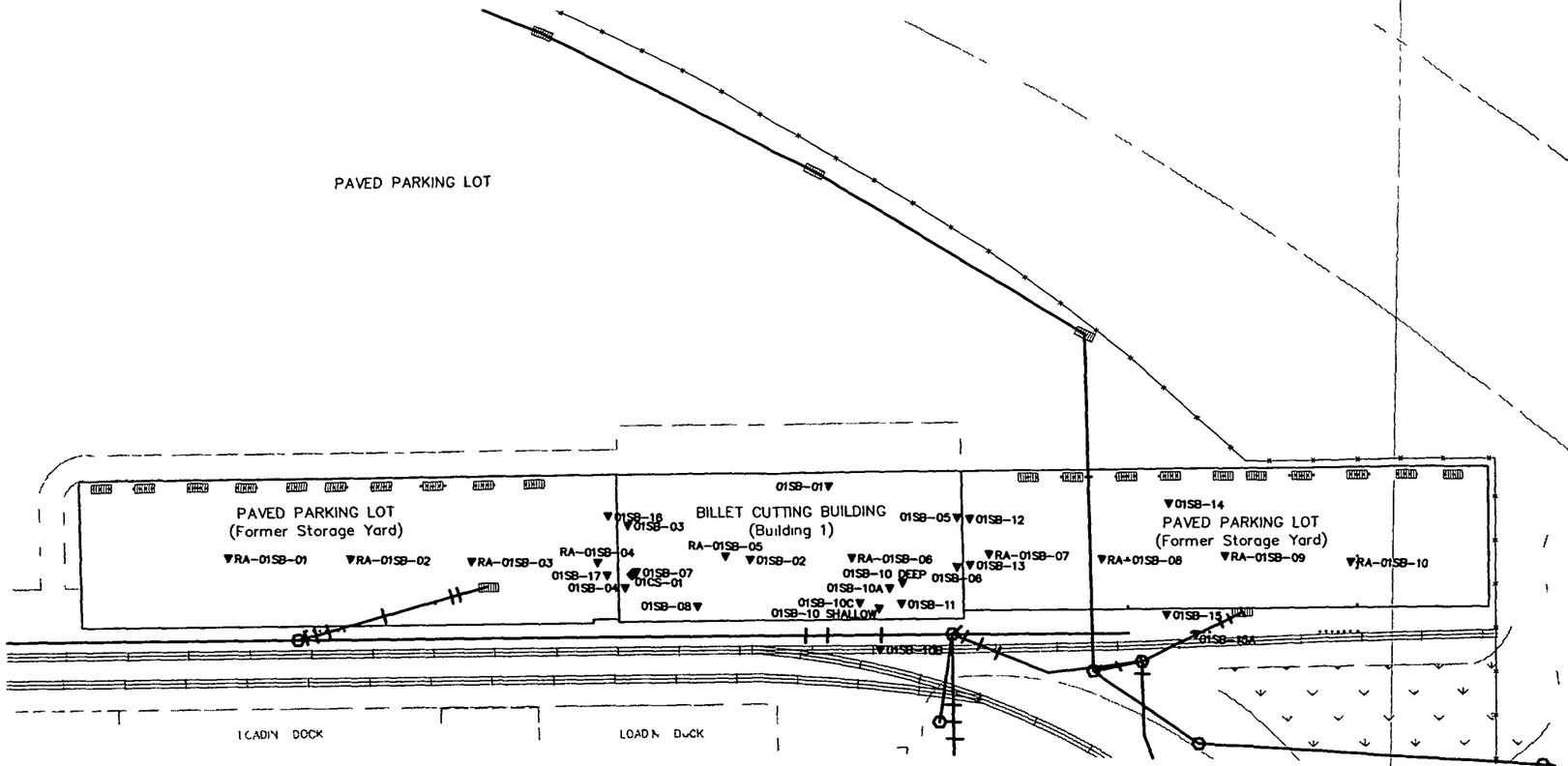
SCALE FEET

URS

10975 El Monte Suite 100
Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
TITLE	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY **SITE-WIDE SAMPLING LOCATIONS**

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	DWG NO
16529173	2/27/04	2-1



LEGEND

- RA-01SB-02▼ SOIL BORING
- 01CS-01◆ CONCRETE SAMPLE
- SEWER LINE (VIDEO SURVEYED)
- SEWER LINE (NOT VIDEO SURVEYED)
- SEWER LINE BREACH
- CATCH BASIN
- MANHOLE
- FENCE
- RAILROAD

N

60 0 60 120

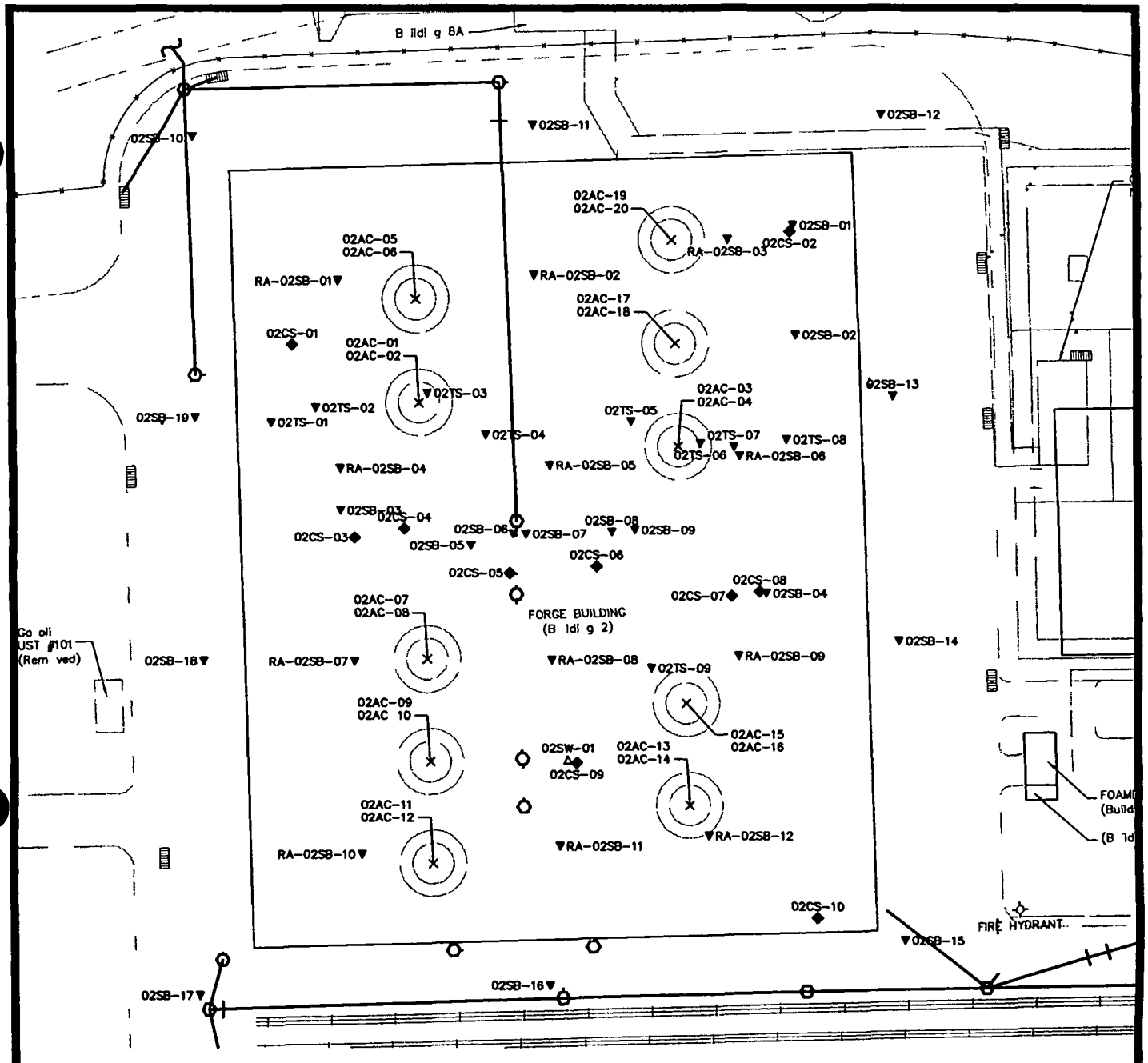
SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	**BUILDING 1 SAMPLING LOCATIONS**

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-2

F bru ry 18 2004 9 29 18 m (TMS)
J \SLAAP\ 6529 73\S Fig 2 2 d g



LEGEND

- RA-02SB-10▼ SOIL BORING
- 02CS-01◆ CONCRETE SAMPLE
- 02SW-01△ SURFACE WIPE SAMPLE
- 02PD-01⊕ PRODUCT SAMPLE
- 02AC-12✕ REFRACTORY BRICK (ACM) SAMPLE
- FORMER FURNACE FOUNDATION
- SEWER LINE (VIDEO SURVEYED)
- SEWER LINE (NOT VIDEO SURVEYED)
- SEWER LINE BREACH
- CATCH BASIN
- MANHOLE
- FENCE
- RAILROAD

N

60 0 60 120

SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI

SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

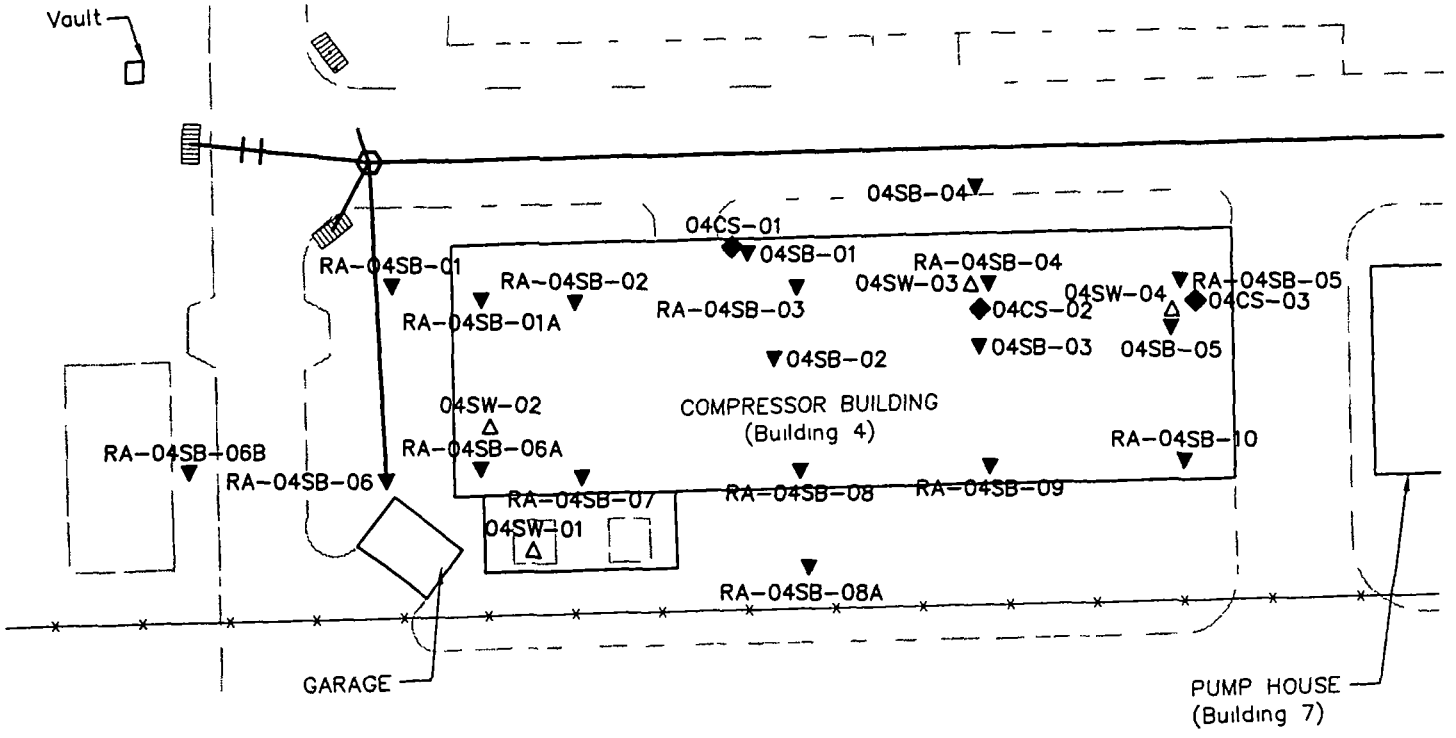
TITLE

BUILDING 2 SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-3

F bru ry 19 ... 0 30 m (TMS)
J \SLAAP\1652... p Fig 2 3 d g

F bru ry 19 2004 9 31 27 m (T S)
J \SLAAP\16529 73\SI p Fig 2 d g



LEGEND

RA-04SB-06B▼	SOIL BORING
04CS-01◆	CONCRETE SAMPLE
04SW-02△	SURFACE WIPE SAMPLE
	SEWER LINE (VIDEO SURVEYED)
	SEWER LINE (NOT VIDEO SURVEYED)
	SEWER LINE BREACH
	CATCH BASIN
	MANHOLE
	FENCE
	RAILROAD

N

40 0 40 80

SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE ST LOUIS ARMY AMMUNITION PLANT

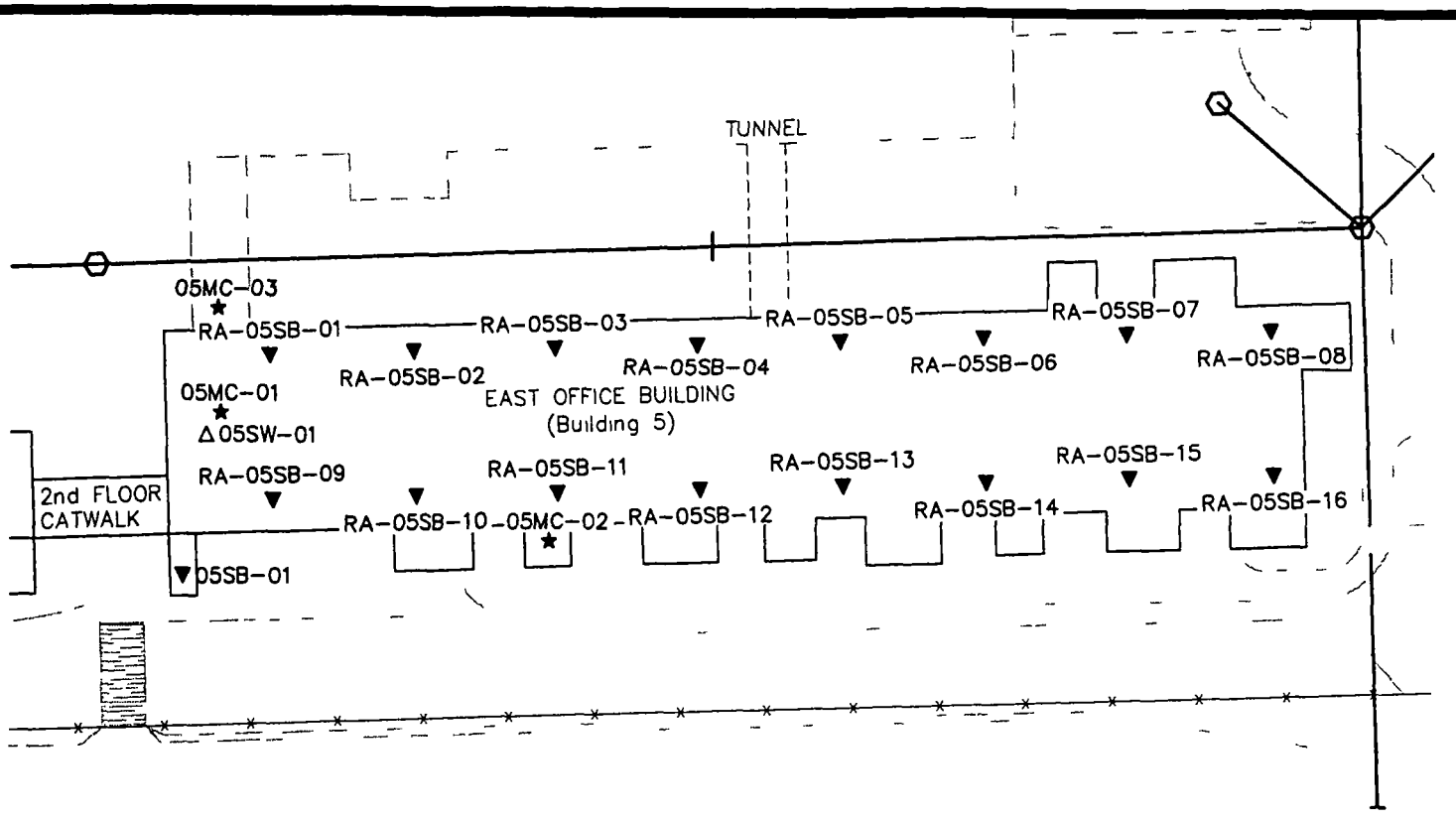
LOCATION ST LOUIS MISSOURI

SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

TITLE

BUILDING 4 SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-4



LEGEND

05SB-01▼	SOIL BORING
05SW-01Δ	SURFACE WIPE SAMPLE
05MC-01★	MASTIC SAMPLE
———	SEWER LINE (VIDEO SURVEYED)
	SEWER LINE (NOT VIDEO SURVEYED)
—+—	SEWER LINE BREACH
▥	CATCH BASIN
⬡	MANHOLE
—×—	FENCE
═══	RAILROAD

N

40 0 40 80

SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE ST LOUIS ARMY AMMUNITION PLANT

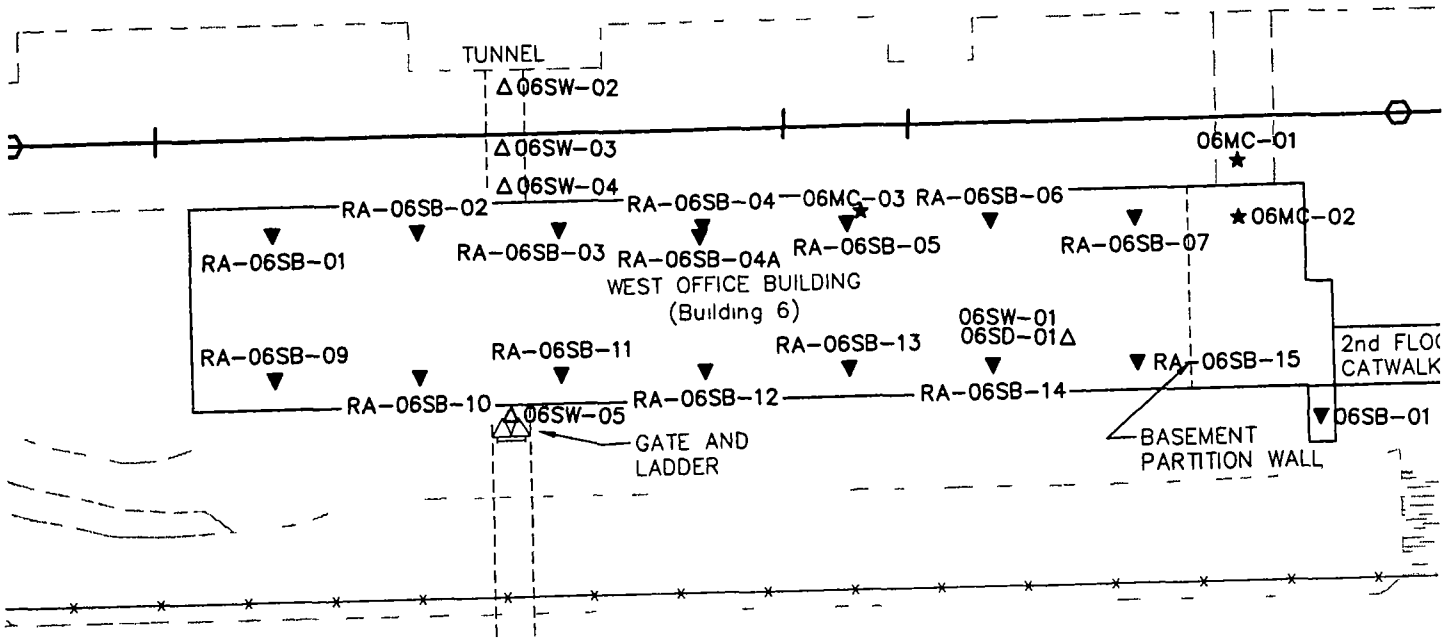
LOCATION ST LOUIS MISSOURI

SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

TITLE

BUILDING 5 SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-5



LEGEND

RA-06SB-01▼	SOIL BORING
06SW-02Δ	SURFACE WIPE SAMPLE
06MC-01★	MASTIC SAMPLE
	SEWER LINE (VIDEO SURVEYED)
	SEWER LINE (NOT VIDEO SURVEYED)
	SEWER LINE BREACH
	CATCH BASIN
	MANHOLE
	FENCE
	RAILROAD

N

40 0 40 80

SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

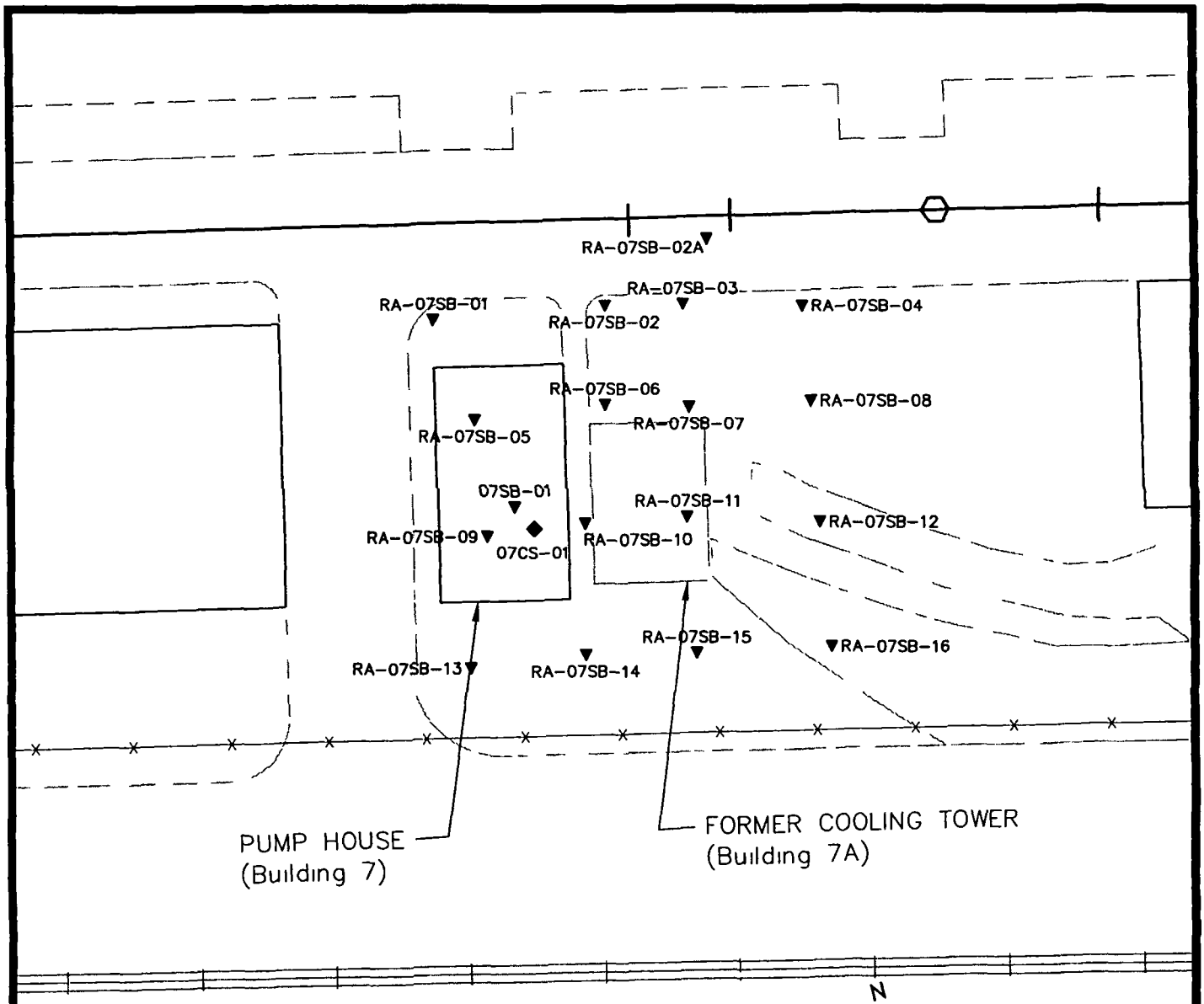
SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI

SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

TITLE

BUILDING 6 SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-6



LEGEND

RA-07SB-13▼	SOIL BORING
07CS-01◆	CONCRETE SAMPLE
	SEWER LINE (VIDEO SURVEYED)
	SEWER LINE (NOT VIDEO SURVEYED)
	SEWER LINE BREACH
	CATCH BASIN
	MANHOLE
	FENCE
	RAILROAD

N

30 0 30 60

SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE ST LOUIS ARMY AMMUNITION PLANT

LOCATION ST LOUIS MISSOURI

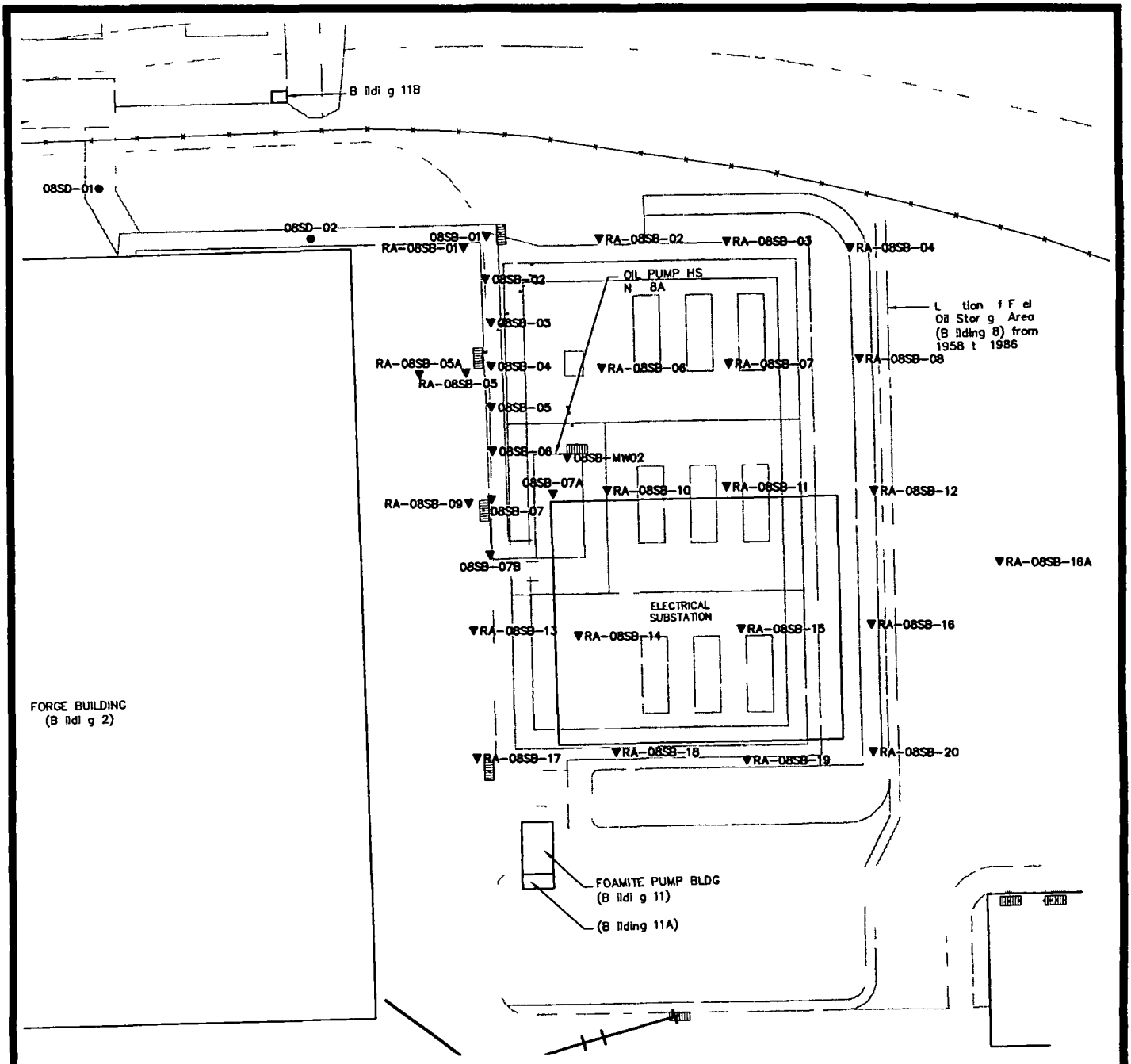
SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

TITLE

BUILDING 7 SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-7

F bru ry 19 2004 9 36 48 m (TMS)
J \SLAAP\16529173\SI p Fig 2 7 d g



SCALE FEET

LEGEND

- 08SB-07B▼ SOIL BORING
- 08SD-02● SEDIMENT SAMPLE
- SEWER LINE (VIDEO SURVEYED)
- SEWER LINE (NOT VIDEO SURVEYED)
- SEWER LINE BREACH
- CATCH BASIN
- MANHOLE
- FENCE
- RAILROAD

URS
10975 El Monte Suite 100
Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI

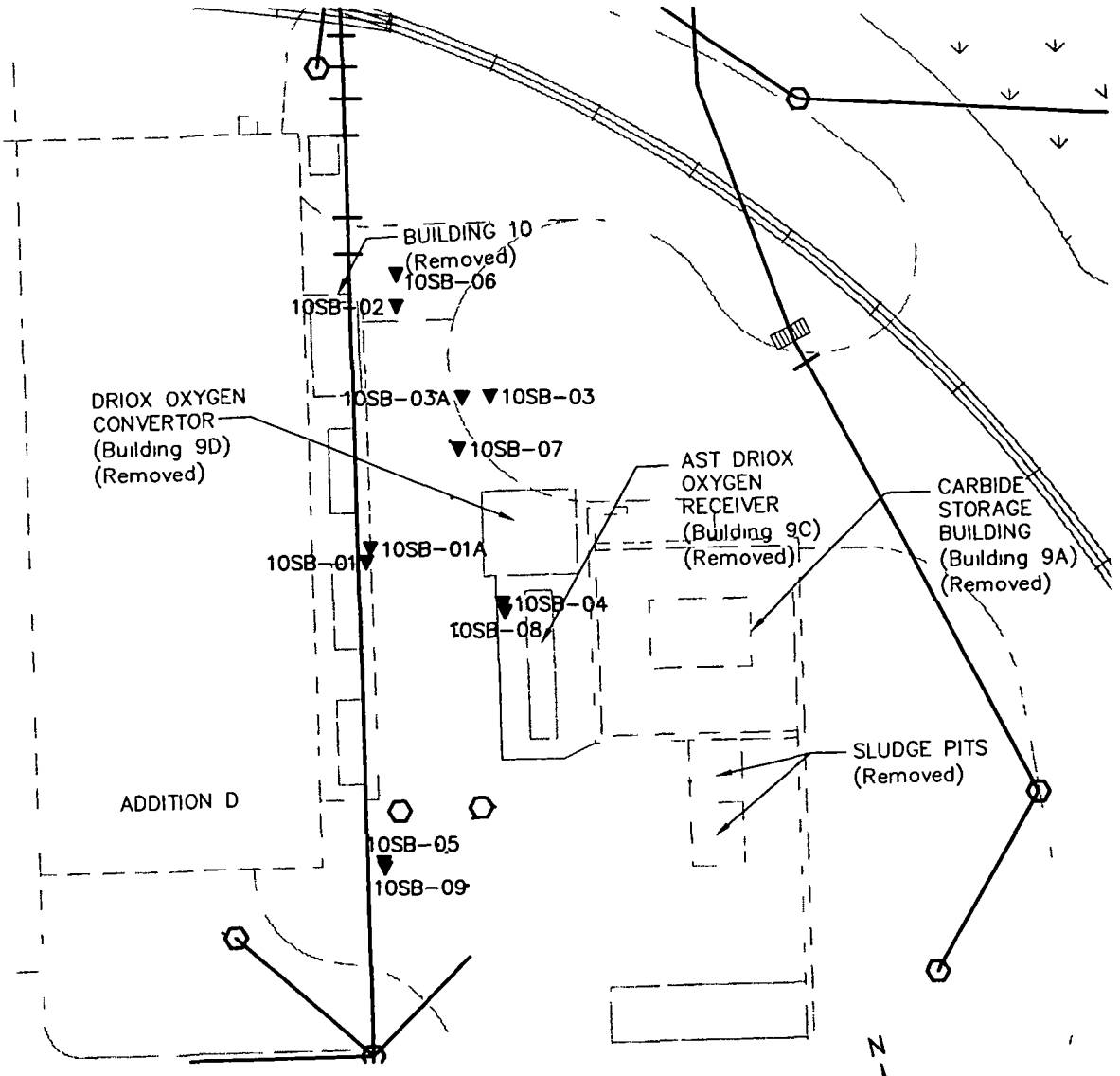
SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

TITLE

BUILDING 8 SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-8

F bru ry 19 2004 9 37 38 m (TMS)
J \SLAAP\16529173\SI p Fig 2 8 d g



LEGEND

- 10SB-09▼ SOIL BORING
- SEWER LINE (VIDEO SURVEYED)
- SEWER LINE (NOT VIDEO SURVEYED)
- SEWER LINE BREACH
- CATCH BASIN
- MANHOLE
- FENCE
- RAILROAD

40 0 40 80

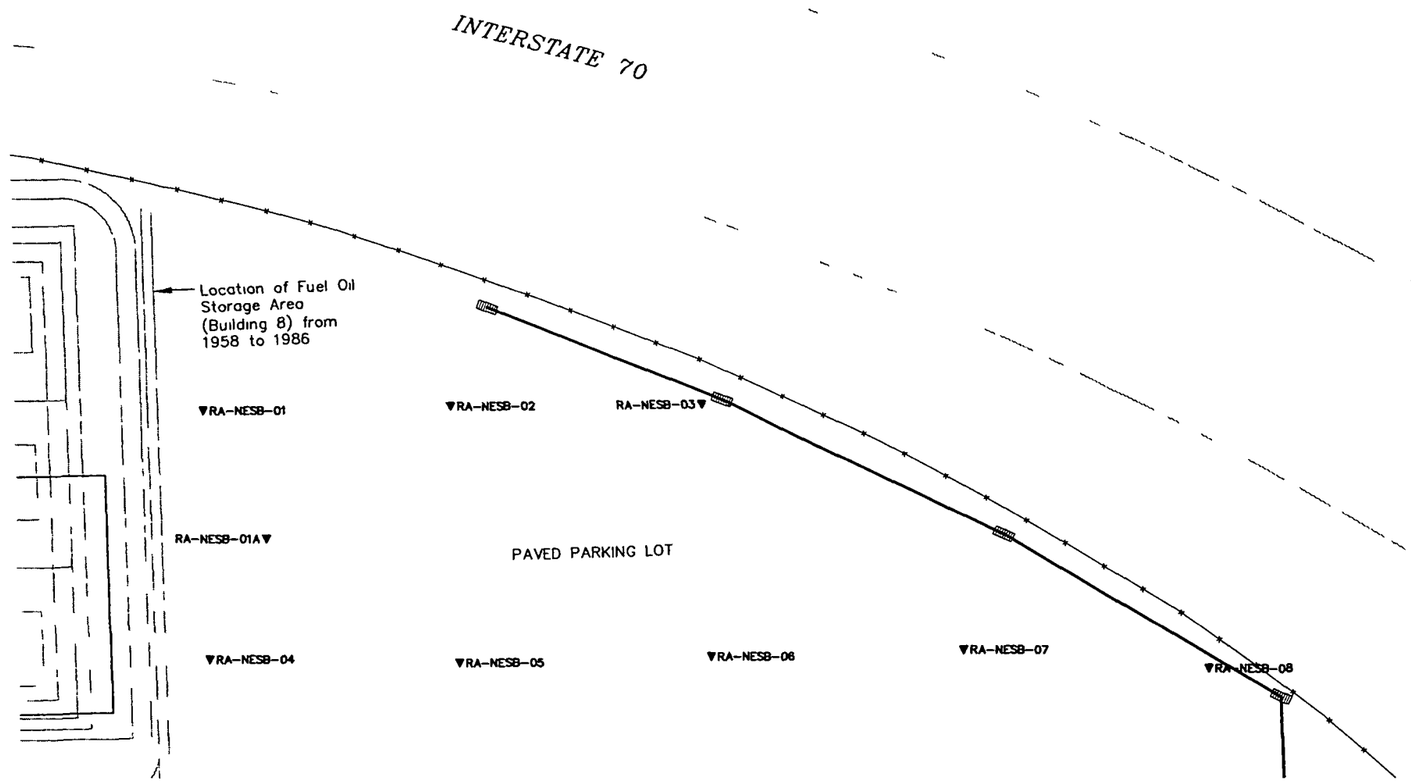
SCALE FEET

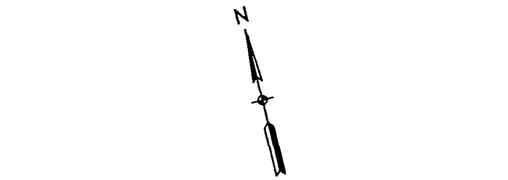
URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	BUILDING 10 SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-9

F bru ry 19 2004 9 38 28 m (TWS)
J \SUAP\16529173\SI p Fig 2 9 d g





LEGEND

RA-NESB-03▼ SOIL BORING
SEWER LINE (VIDEO SURVEYED)
SEWER LINE (NOT VIDEO SURVEYED)
SEWER LINE BREACH
CATCH BASIN
MANHOLE
FENCE
RAILROAD

URS
10975 El Monte Suite 100
Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	NORTHEAST PARKING AREA SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-10

F bru ry 19 2004 9 39 05 m (1MS)
J:\SLAAP\16529173\SI p Fig 2 10 d g

LEGEND

RA–RRSB–05▼ SOIL BORING
SEWER LINE (VIDEO SURVEYED)
SEWER LINE (NOT VIDEO SURVEYED)
SEWER LINE BREACH
CATCH BASIN
MANHOLE
FENCE
RAILROAD

Building
Building
Location of F 08
Storage Area (Building
8) from 944 to 58
Building B
Building 8A
INTERSTATE 70
OIL PUMP
HS-No. 8A.
Location of Fuel Oil
S orage Area
(Buildin 8) om
958 86
ELECTRICAL
SUBSTATION
VED PARKING LOT
FORGE BUILDING (Building
2)
FOAMITE PUMP BLDG.
(Building)
(Building)
fire HYDRANT
P VED ARKING LOT
(Formed Storage Yard)
BILLET CUTTING BUILDING
(Building)
P VED PARKING LOT
(Former Storage ard)
RA–RRSB–01
RA–RRSB–02
RA–RRSB–03
RA–RRSB–04
RA–RRSB–05
RA–RRSB–06
RA–RRSB–07
RA–RRSB–08
RA–RRSB–09
RA–RRSB–10A
RA–RRSB–10B
RA–RRSB–10
RA–RRSB–10C
RA–RRSB–10D
RA–RRSB–11
DADING DOCK
LOADING DOCK
LOADING DOCK
GASOLINE DISPENSER (Removed)
GASOLINE UST (Removed)
QUENCH SLUDGE PIT (Removed)
BUILDING
0
(Removed)
DROX OXYGEN
CONVERTOR
(Building 9D)
(Removed)
CARBIDE
STORAGE
BUILDING
(Building 9)
(Removed)
MACHINING BUILDING
(Building 3) (Removed)
QUENCH OIL TANKS
(emoved)
ADDITION D
SLUDGE
PITS
(Removed)
ACETYLEN
GENERATOR
BUILDING
(Building 9)
(Removed)
AST DROX
OXYGEN
RECEIVER
(Building 9C)
(Removed)
2nd FLOOR
CATWALKS
(Removed)
TUNNEL
TUNNEL
P VED
PARKING
LOT
COMPRESSOR BUILDING
(Building)
WEST OFFICE BUILDING
(Building 6)
2nd FLOOR
CATWALK
EAST OFFICE BUILDING
(Building 5)
GATE AND LADDER
GUARD HOUSE
(Gat 9)
GARAGE
PUMP HOUSE
(Building 7)
FORMER COOLING TOWER
(Building 7A)
TO SLOP
PROPERTY

N

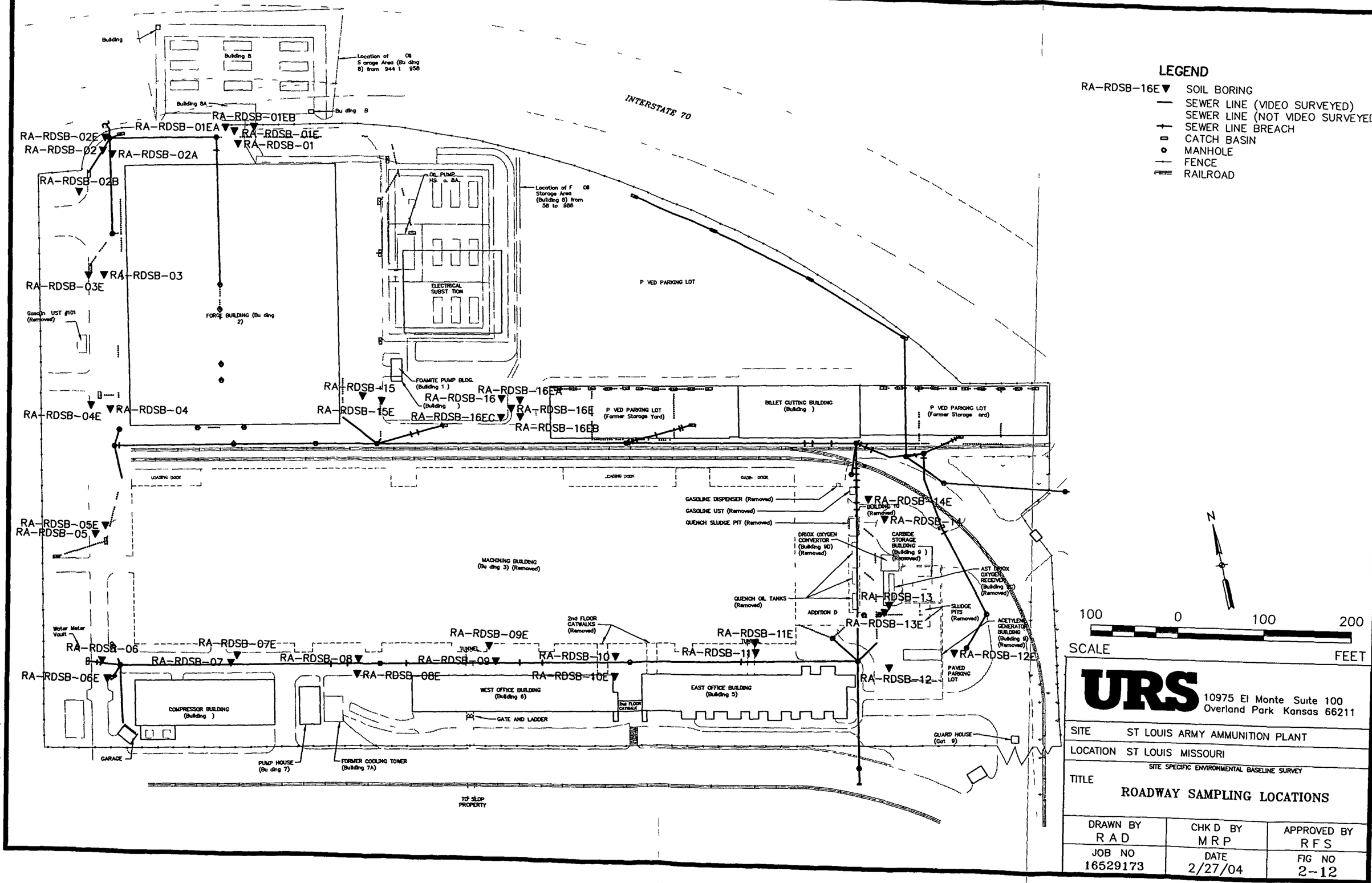
100 0 100 200
SCALE FEET

URS 10975 El Monte Suite 100
Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	RAILROAD SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2–11

F bru ry 19 2004 9 58 55 m (TMS)
J \SLAAPA\16529173\SI p Fig 2 11 d g

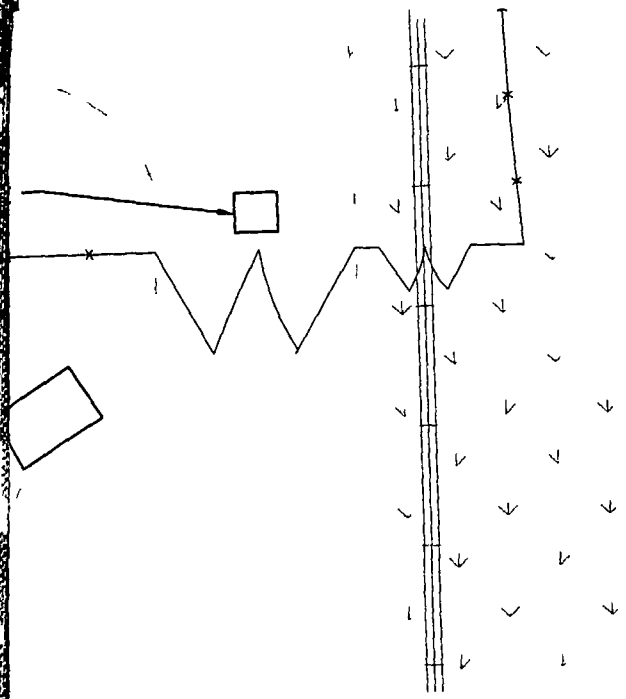


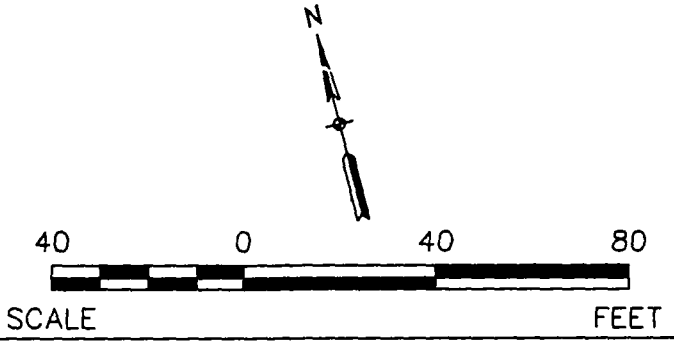
URS
10975 El Monte Suite 100
Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	ROADWAY SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	2-12

F bru ry 19 2004 9 59 45 m (TMS)
J \SLAAP\16529173\SI p Fig 2 12 d g





URS

10975 El Monte Suite 100
Overland Park Kansas 66211

SITE ST LOUIS ARMY AMMUNITION PLANT

LOCATION ST LOUIS MISSOURI

SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

TITLE

SEWER SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	DWG NO
16529173	2/27/04	2-13

LEGEND

- SWMW-06 ⊕ MONITORING WELL
- ⊕ FIRE HYDRANT
- SEWER LINE (VIDEO SURVEYED)
- SEWER LINE (NOT VIDEO SURVEYED)
- SEWER LINE BREACH
- CATCH BASIN
- MANHOLE
- FENCE
- RAILROAD

Building
Bu din 8
Location of 08 S orage Area (Building) from 944 958
Bu din 8A
Bu ding 8
INTERSTATE 70
08MW-01
SWMW-01
OIL PUMP HS-N 8A
Location of F el Oil Storage Area (Building 8) from 958 to 1986
SWMW-07
08MW-02
ELECTRICAL SUBST TION
PAVED ARKING LOT
SWMW-06
FORGE BUILDI G (Buildin 2)
08MW-03
FOAMITE PUMP BLDG. (Bu ding)
(Bu ding)
03MW-01
FIRE HYDRANT
02MW-01
P VED PARKING LOT (Formel Storage ard)
BILLET CUTTING BUILDING (Building)
P VED PARKING LO (Former Storage ard)
LOADING DOCK
LOADING DOCK
LOADING DOCK
10MW-01
GASOLINE DISPENSER (Removed)
GASOLINE UST (Removed)
QUENCH SLUDGE PIT (Removed)
BUILDING 0 (Removed)
DRIOX OXYGEN CONVERTOR (Building 9D) (Removed)
CARBIDE STORAGE BUILDING (Building 9) (Removed)
SWMW-02
ACHINING BUILDING (Building 3) (Removed)
QUENCH OIL TANKS (Removed)
ADDITION D
AST DRIOX OXYGEN RECEIVER (Building 9C) (Removed)
SLUDGE PITS (Removed)
ACETYLENE GENERATOR BUILDING (Building 9) (Removed)
2nd FLOOR CATWALKS (Removed)
TUNNEL
TUNNEL
PAVED PARKING LOT
SWMW-05
Water Tar Vau
COMPRESSOR BUILDING (Building 4)
WEST OFFICE BUILDING (Building 6)
2nd FLOOR CATWALK
EAST OFFICE BUILDING (Building 5)
GUARD HOUSE (Gate 9)
SWMW-03
GATE AND LADDER
SWMW-04
GARAGE
PUMP HOUSE (Building 7)
FORMER COOLING TOWER (Building 7)
TOP SLOP PROPERTY

N

100 0 100 200
SCALE FEET

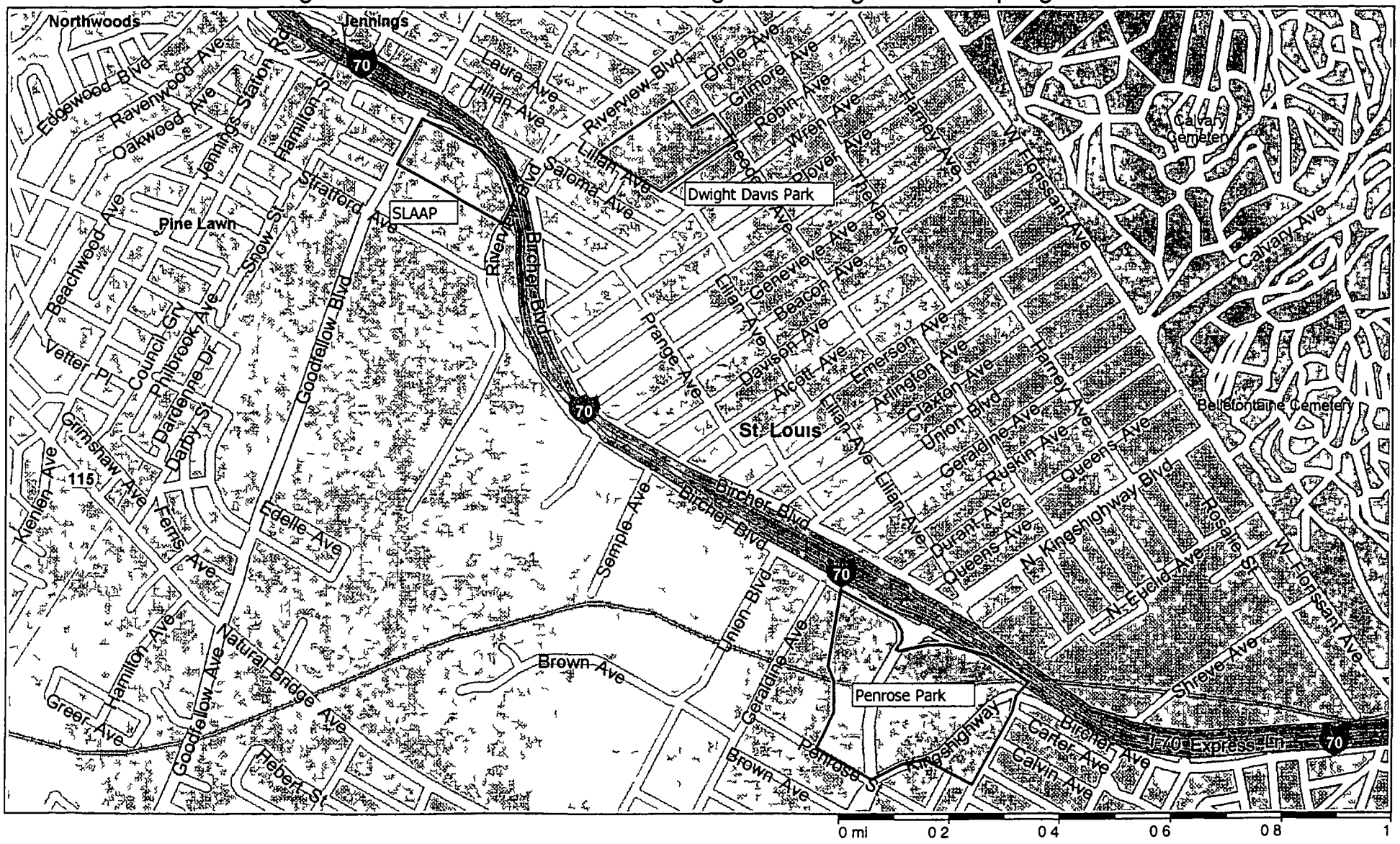
URS 10975 El Monte Suite 100 Overland Park Kansas 66211

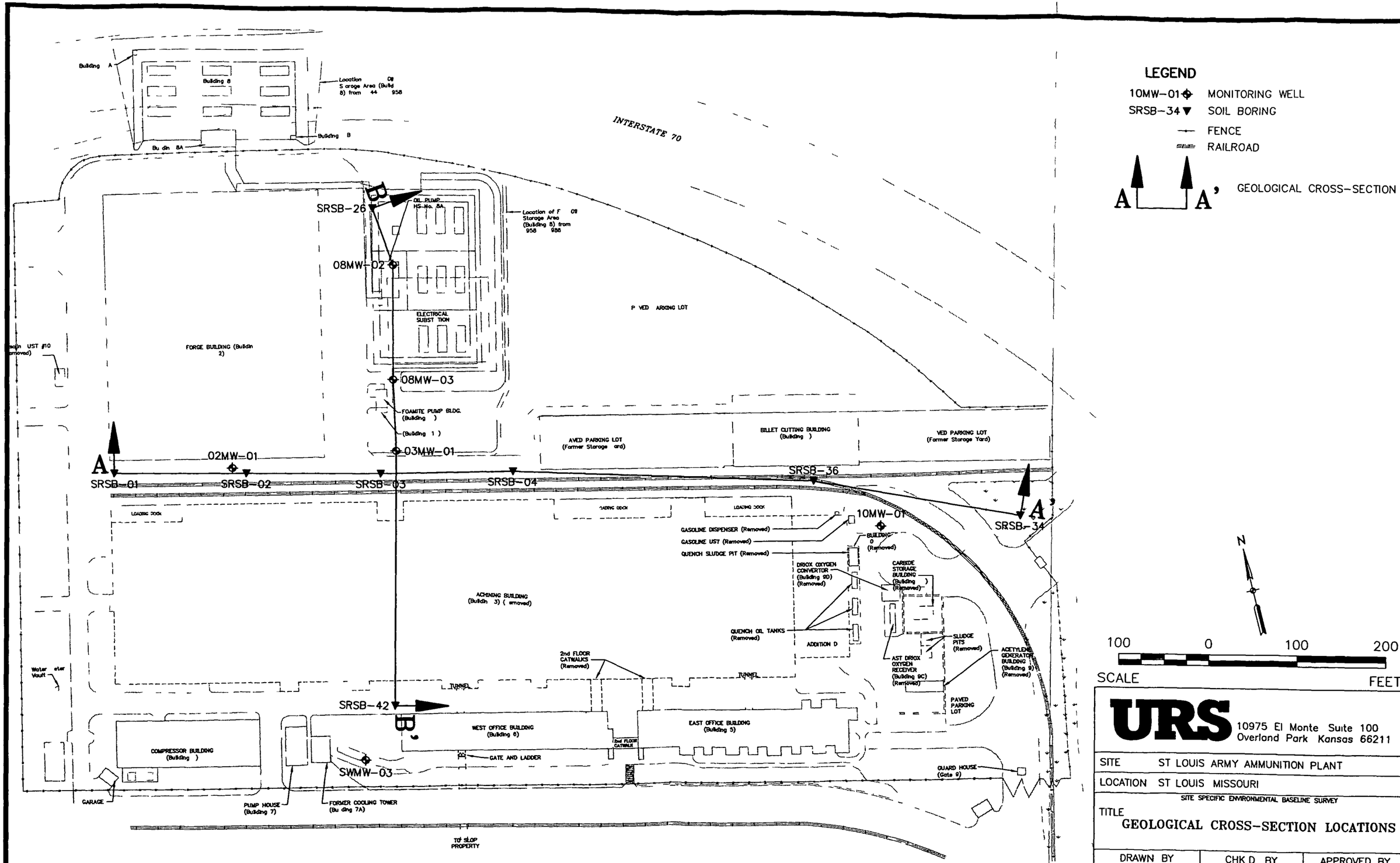
SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	GROUNDWATER SAMPLING LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO 16529173	DATE 2/27/04	FIG NO 2-14

F bru ry 19 2004 10 02 25 m (TMS)
J \SLAAP\16529173\SI p Fig 2 14 d g

Figure 2-15 Location of Site and Regional Background Sampling Areas





LEGEND

- 10MW-01 ◆ MONITORING WELL
- SRSB-34 ▼ SOIL BORING
- FENCE
- RAILROAD
- A — A' GEOLOGICAL CROSS-SECTION

N

100 0 100 200

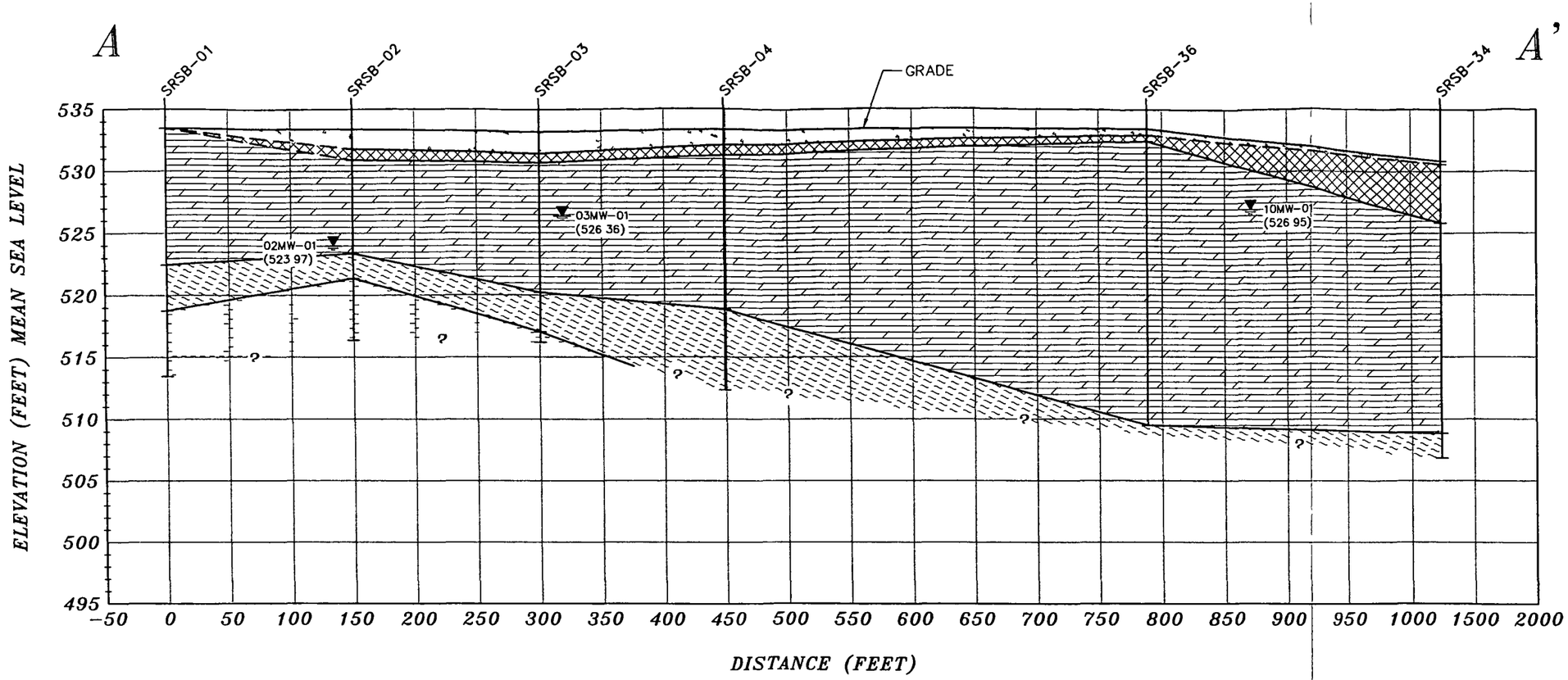
SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	GEOLOGICAL CROSS-SECTION LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	3-1

F b n 19 200 10 03 7 m (T S)
J \SLAAP\16529173\SI p Fig 3 d g



LEGEND

- CONCRETE
- FILL
- LEAN CLAY
- GRAVEL
- FAT CLAY
- SHALE

- WATER TABLE ELEVATION MEASURED ON 4/30/03
- DEFINED GEOLOGICAL CONTACT
- INTERPRETED GEOLOGICAL CONTACT
- ? EXTENT UNKNOWN

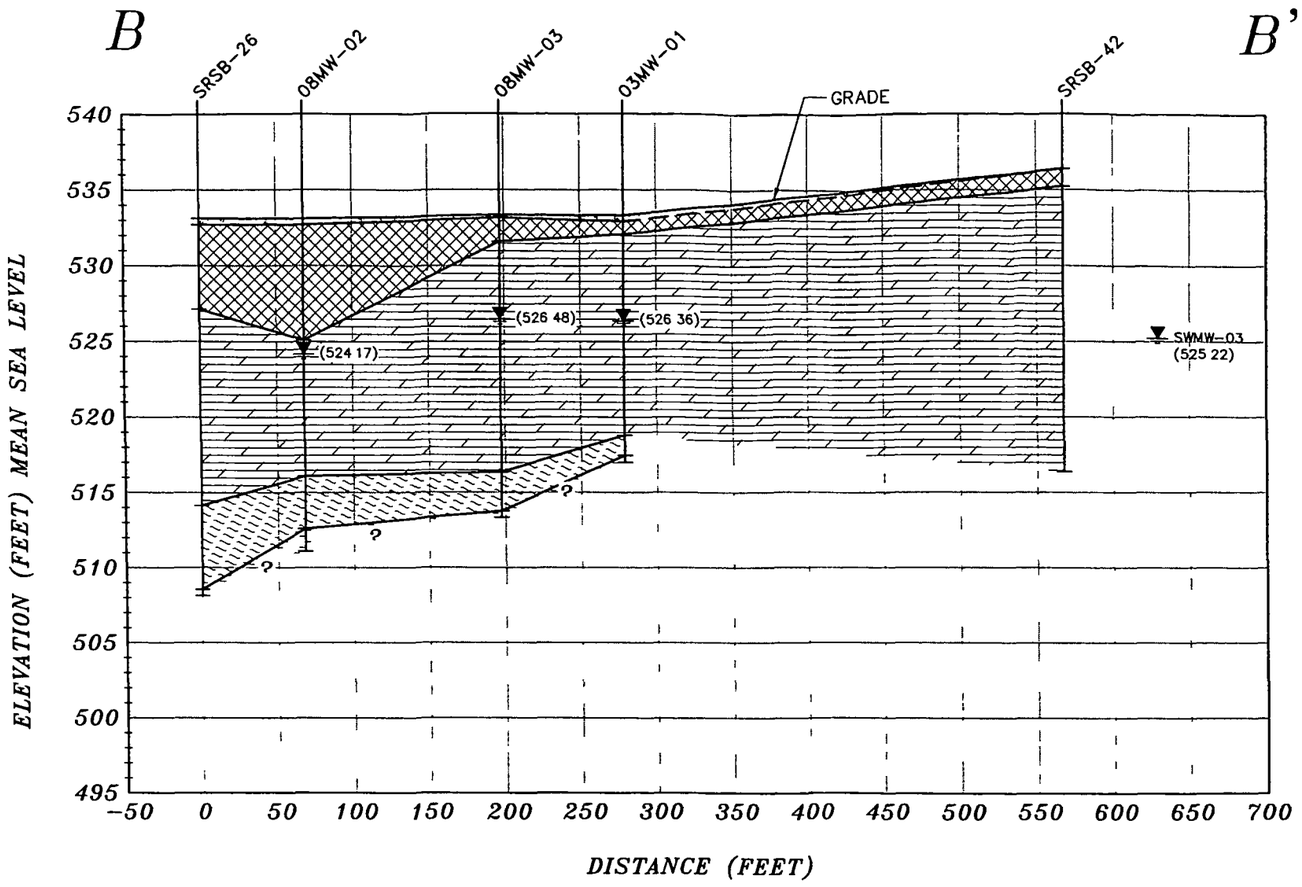
10
5
0
0 50 100
SCALE IN FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	GEOLOGICAL CROSS-SECTION A-A

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	3-2

F bru pr 9 200 0 05 1 m (TWS)
J \SLA P\16529 73\S p Fig 3 2 d g



LEGEND

- CONCRETE
- FILL
- LEAN CLAY
- GRAVEL
- FAT CLAY
- SHALE

- WATER TABLE ELEVATION MEASURED ON 4/30/03
- DEFINED GEOLOGICAL CONTACT
- INTERPRETED GEOLOGICAL CONTACT
- ? EXTENT UNKNOWN

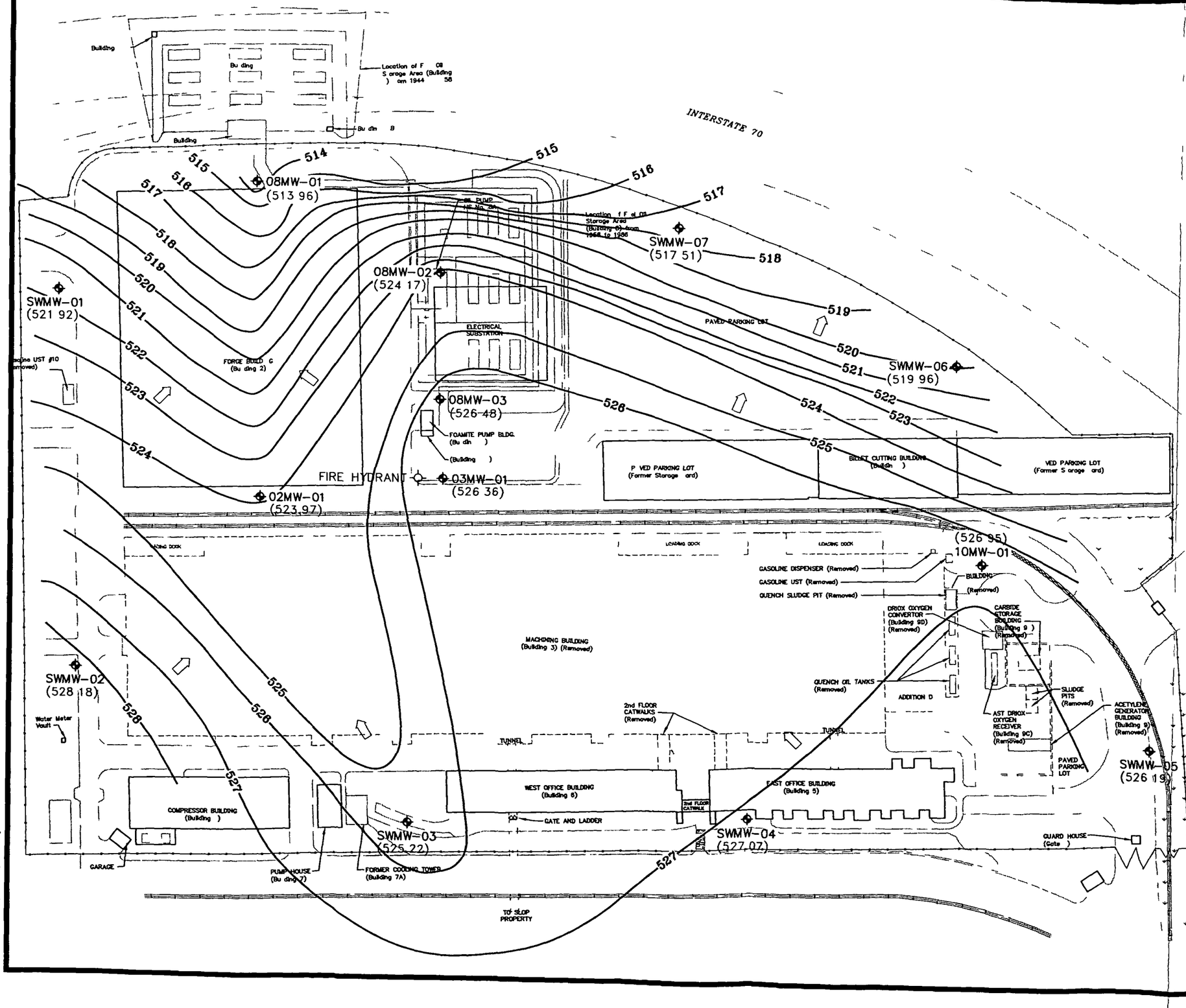
10
5
0
0 50 100
SCALE IN FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	GEOLOGICAL CROSS-SECTION B-B

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	3-3

F bru rv 9 200 10 05 58 m (TMS)
J:\SLAM\16529173\SI p Fig 3 3 4 9



LEGEND

- SWMW-06 ◆ MONITORING WELL
- (519 96) WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- FIRE HYDRANT
- FENCE
- RAILROAD
- –517– GROUNDWATER SURFACE ELEVATION (CONTOUR INTERVAL IS ONE FOOT)
- GROUNDWATER FLOW DIRECTION

N

100 0 100 200

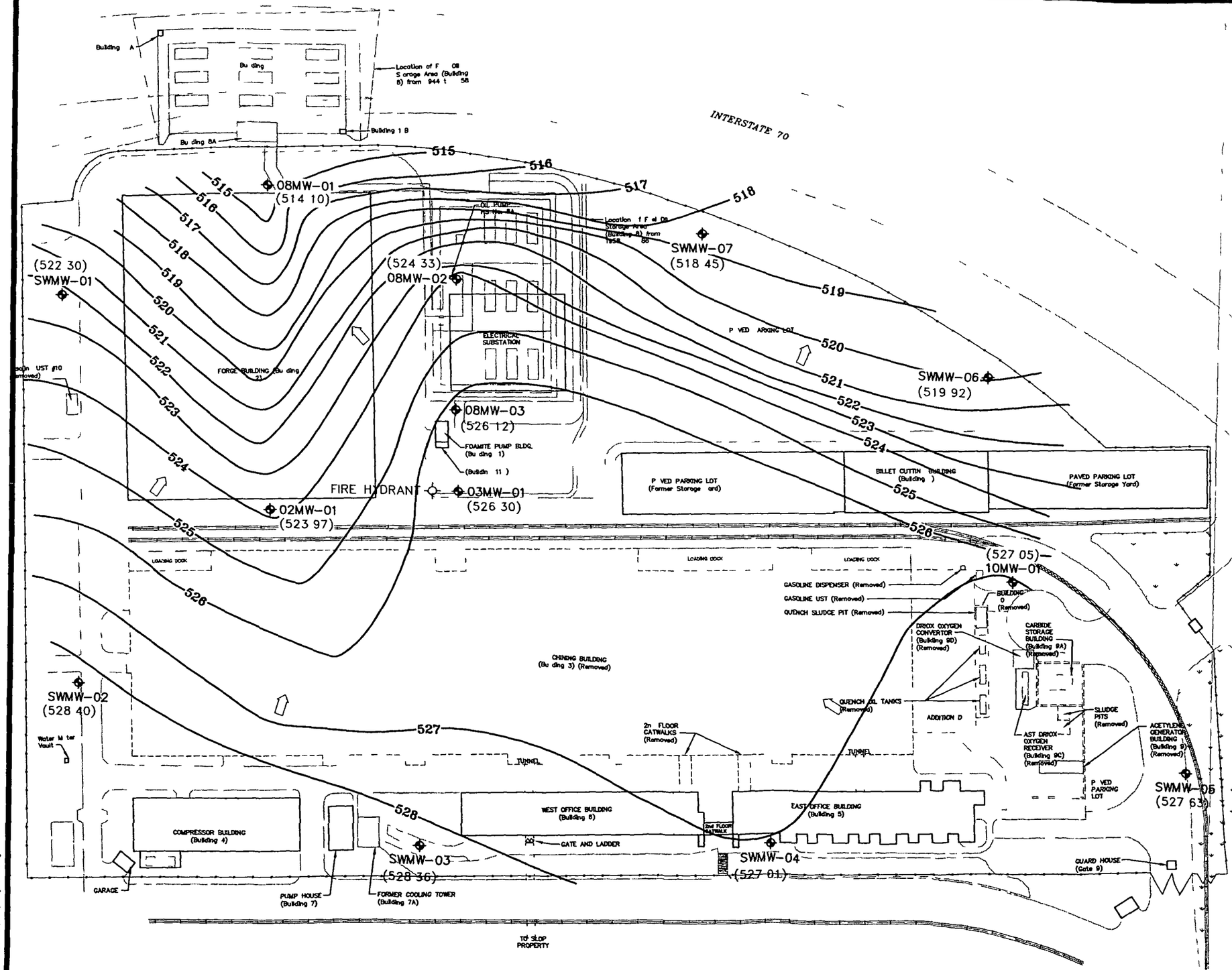
SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
TITLE	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY GROUNDWATER SURFACE ON 4/30/2003

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	4–1

F bru ry 19 200 10 06 47 m (THS)
J \SLAAP\16529173\SI p Fig 4 1 d g



LEGEND

- SWMW-06 ◆ MONITORING WELL
- (518 45) WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- FIRE HYDRANT
- FENCE
- RAILROAD
- –517– GROUNDWATER SURFACE ELEVATION (CONTOUR INTERVAL IS ONE FOOT)
- GROUNDWATER FLOW DIRECTION

N

100 0 100 200

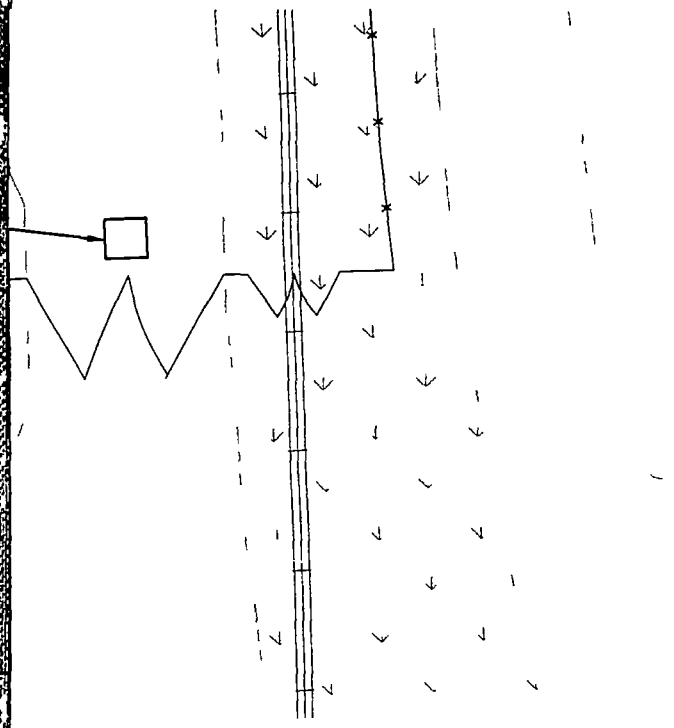
SCALE FEET

URS 10975 El Monte Suite 100 Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY
TITLE	GROUNDWATER SURFACE ON 5/8/2003

DRAWN BY	CHK D BY	APPROVED BY
R A D	M R P	R F S
JOB NO	DATE	FIG NO
16529173	2/27/04	4-2

F bru ry 9 2004 10 07 42 m (TMS)
J \SLAAP\16529173\SI p Fig 4 2 d g



40 0 40 80

SCALE FEET

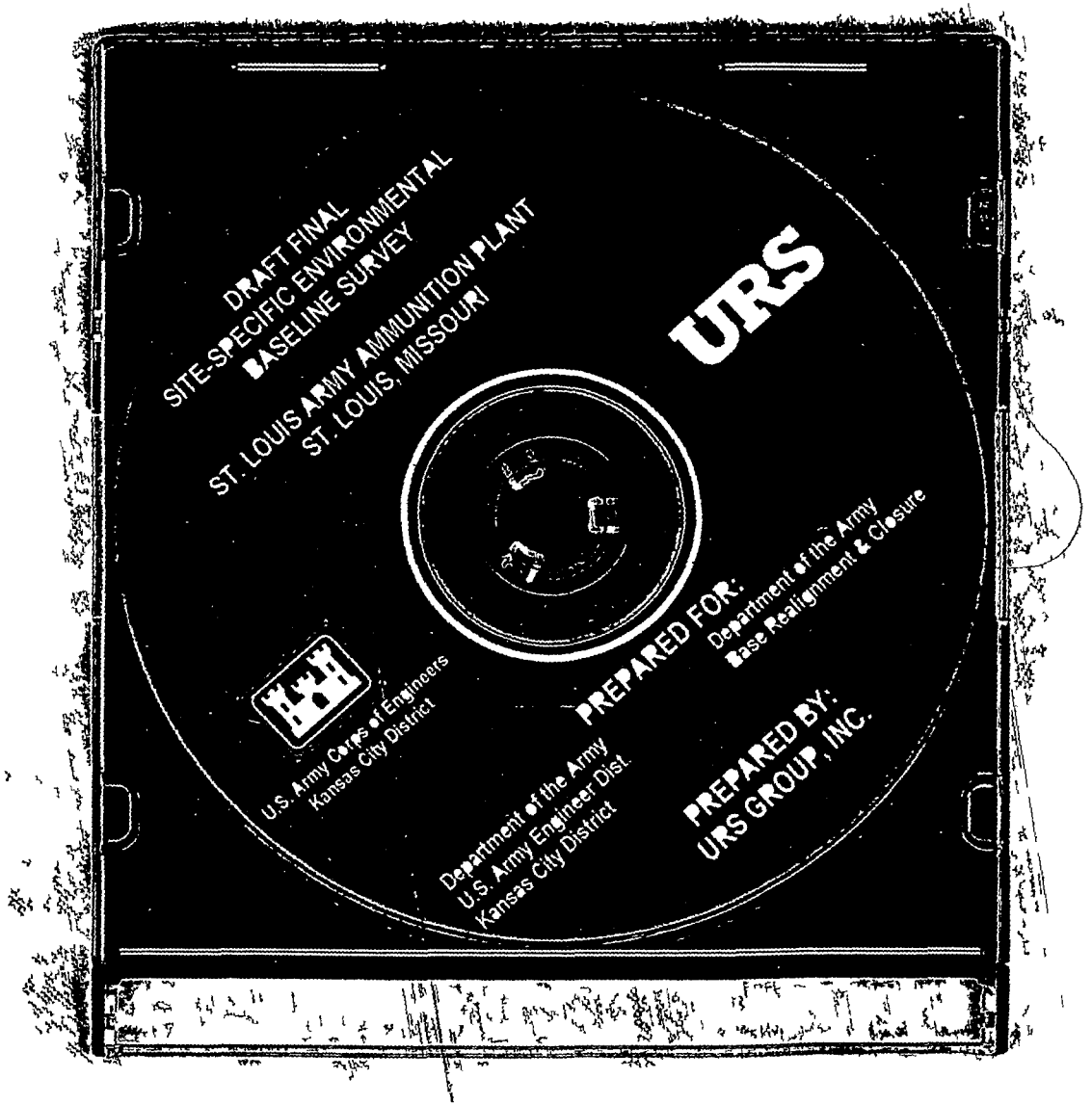
URS

10975 El Monte Suite 100
Overland Park Kansas 66211

SITE	ST LOUIS ARMY AMMUNITION PLANT
LOCATION	ST LOUIS MISSOURI
TITLE	SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY

SITE-WIDE HOTSPOT LOCATIONS

DRAWN BY	CHK D BY	APPROVED BY
T M S	M G M	J C G
JOB NO	DATE	FIG NO
16529173	2/27/04	6-1


DRAFT FINAL
SITE-SPECIFIC ENVIRONMENTAL
BASELINE SURVEY
ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI
URS
PREPARED FOR:
Department of the Army
Base Realignment & Closure
PREPARED BY:
URS GROUP, INC.
U.S. Army Corps of Engineers
Kansas City District
Department of the Army
U.S. Army Engineer Dist.
Kansas City District